

THE CONTENTS OF THIS SECTION ARE
THE HIGHEST QUALITY AVAILABLE

INITIATED 9/27/02 DATE 9/27/02

PAGE NUMBERING SEQUENCE IS INCONSISTENT

Appendix A

Verification of STOMP Model Numerical Results for the Design of the ICDF

Appendix A

Verification of STOMP Model Numerical Results for the Design of the ICDF

A.1 INTRODUCTION

The purpose of this appendix is to verify the numerical simulation accuracy of the fate and transport model results for the (ICDF). The verification simulations were performed for I-129 because this was the primary contaminant of concern identified in the ICDF flow and transport modeling.

The ICDF fate and transport modeling effort used the Subsurface Transport Over Multiple Phases (STOMP) version 2.0 finite difference code developed by Pacific Northwest National Laboratory (PNNL) to conduct the simulations. A description of the STOMP code is found in the Theory Guide (PNNL 1996) and the User's Guide (PNNL 2000). This code was selected over simpler codes for its ability to simulate flow and transport through the hydraulically complex Idaho National Engineering and Environmental Laboratory (INEEL) unsaturated zone. In particular, the INEEL unsaturated zone consists of engineered barrier layers under the waste and alternating basalt and interbed layers down to the aquifer. Each of the sediment and rock layers has dramatically different hydraulic and transport characteristics. This heterogeneity is difficult for numerical models to accurately simulate. STOMP has been shown to have this capability.

Because the responsible managers are not necessarily familiar with the STOMP model or modelers, verification simulations were performed using GWSCREEN Version 2.5a. GWSCREEN version 2.5 is documented in Rood, 1999. GWSCREEN is one of the primary subsurface transport codes used at the INEEL for *Comprehensive Environmental Response, Compensation, and Liability Act* and Performance Assessment related simulations. GWSCREEN is readily available and has been used by a number of the regulators responsible for approval of the ICDF construction. GWSCREEN is much easier to use than STOMP so that the chances of user error are reduced. In addition, the semi-analytical solution contains little numerical error providing a reliable solution for verification of the STOMP results.

Although GWSCREEN cannot accurately simulate complex flow through the heterogeneity of the INEEL unsaturated zone, approximations were made to develop a conceptual model in which transport is essentially equivalent to the STOMP conceptual model. This is possible primarily because steady state flow dominates STOMP flow system and the transport time through basalt in the unsaturated zone is insignificant compared to unsaturated zone transport through the other layers.

The I-129 fate and transport verification simulations were performed using GWSCREEN together with a two-compartment source term model as described in Section 2.1.

An underlying assumption of the two-compartment model is that contaminants are leached from the waste using a first order leaching function, then transported into the clay layer, and then leached from the clay layer to the unsaturated zone. This two-compartment model was created in Microsoft Excel and the resulting flux imported into GWSCREEN as a user defined discrete source release function to the unsaturated zone. This allows the modelers to account for transport through a clay layer with a different K_d value and different hydraulic characteristics than the waste or the interbeds. GWSCREEN's built in source term is limited to a waste volume and single unsaturated layer.

A.2 CONCEPTUAL MODELS

The conceptual model and numerical discretization used for the ICDF design fate and transport modeling is shown in Figure A-1. Flow results from the STOMP simulation are shown in Figure A-2. Figures A-3 and A-4 show the conceptual model used for the GWSCREEN simulations and the two-compartment model used to simulate separately the waste and a clay layer. Important assumptions and differences are listed below.

- For the validation simulations, the infiltration rate is assumed to be 0.01 m/year at the top of the ICDF, which corresponds to the assumed natural background infiltration rate in INEEL soils. However, the area of the top of the waste facility has an area 74% larger than the area of the bottom of the facility. Therefore, the infiltration rates listed in the body of this flow and transport report are increased by 74% for all of the simulations. Consequently, the validation simulations are performed for an infiltration rate of 0.0174 m/year, to be consistent with the ICDF design simulations.
- The initial water pressures and water saturations are calculated in STOMP assuming a steady state infiltration rate of 0.01 m/year. When the cover is placed over the waste, the infiltration rate is changed to correspond to steady state infiltration predicted to move through the cover and funneled down through the ICDF.
- In the STOMP model, there is a transient flow period when the system adjusts from the initial conditions based on a 0.01 cm/year infiltration rate to the rate simulated for the facility. For the verification simulations the pressures and saturation will increase, as the infiltration rate is increased from 0.01 m/year to 0.0174 m/year. However, for the design infiltration rate of 0.000174 m/year (1.74 times 0.1 mm/year), the pressure and saturation will significantly decrease. After a relatively short period of time, the system equilibrates to the new infiltration rate and steady state flow continues to the end of the simulation.
- The STOMP model simulates the water transport through the different layers in the unsaturated zone. The GWSCREEN model assumes instantaneous transport of water and contaminants through the unsaturated zone basalts. Therefore, for the GWSCREEN simulation, the sediment and interbed layers below the waste are simulated as one homogeneous layer with a thickness equal to the sum of the layers.
- The receptor point is assumed to be 78 m from the downgradient edge of the waste, which is 20 m from the downgradient edge of the cover. For the GWSCREEN input file, the assessment location is input from the middle of the ICDF. Since the ICDF has a bottom length of 160 m, the GWSCREEN distance to the assessment point is 158 m.
- The saturation in the waste area is non-uniform, increasing with depth. STOMP simulates this variation in moisture content but for GWSCREEN, an average value must be assumed. This will have some affect on the contaminant releases from the waste to the layers below. Therefore, the GWSCREEN simulation results are not expected to exactly reproduce the STOMP results.

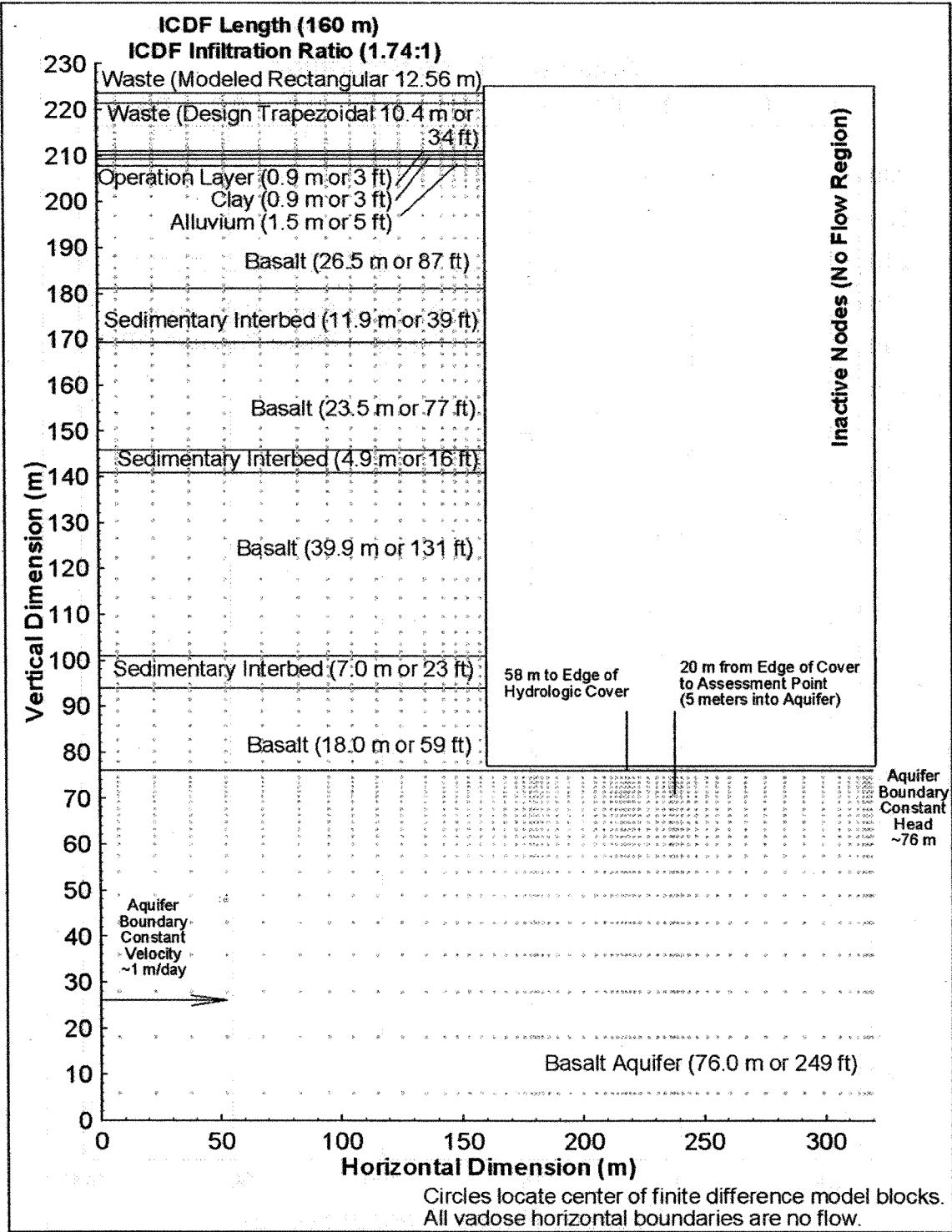


Figure A-1. Conceptual model and finite difference grid used for the ICDF STOMP fate and transport modeling.

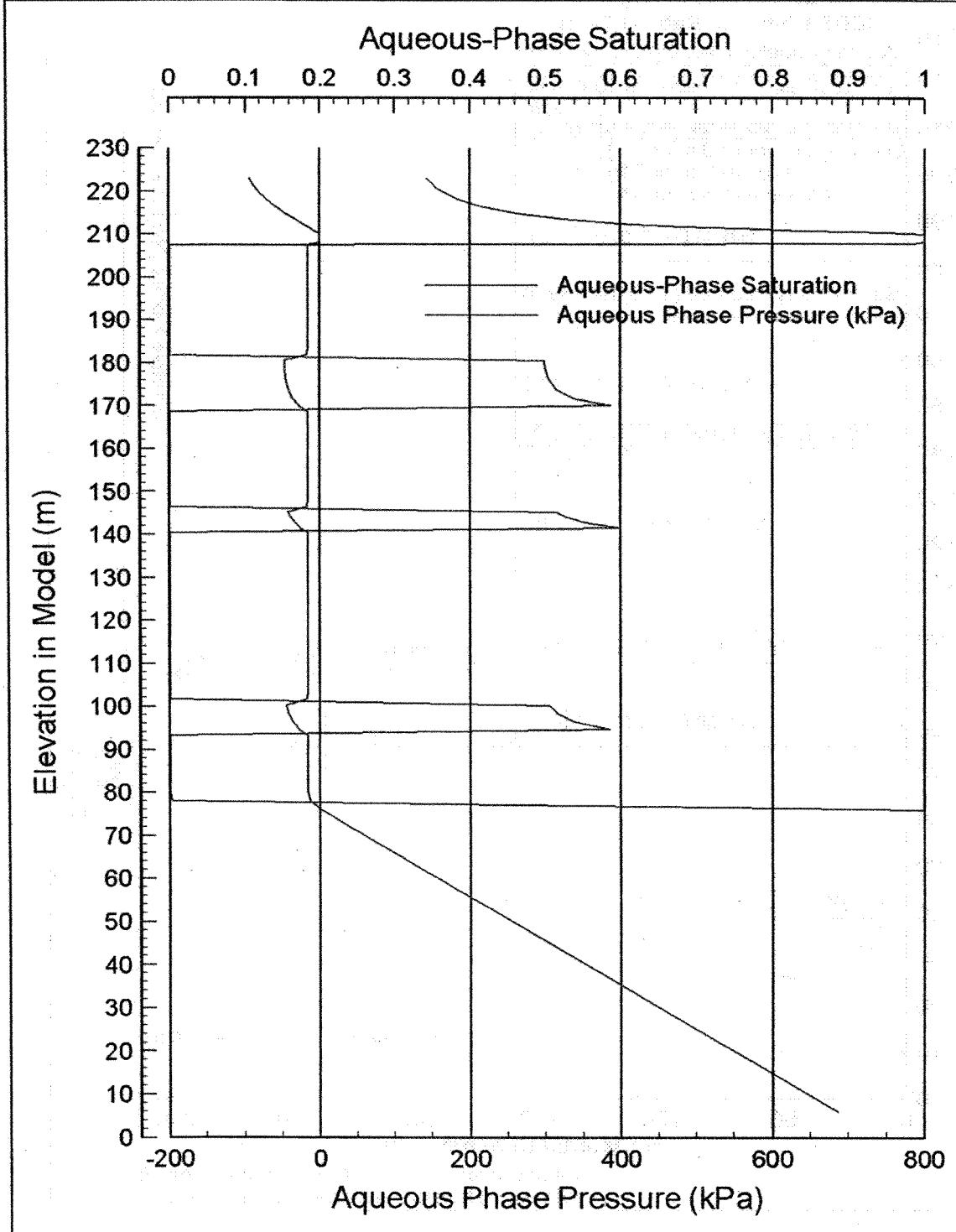


Figure A-2. STOMP steady state saturation and pressure predictions over the ICDF vertical profile.

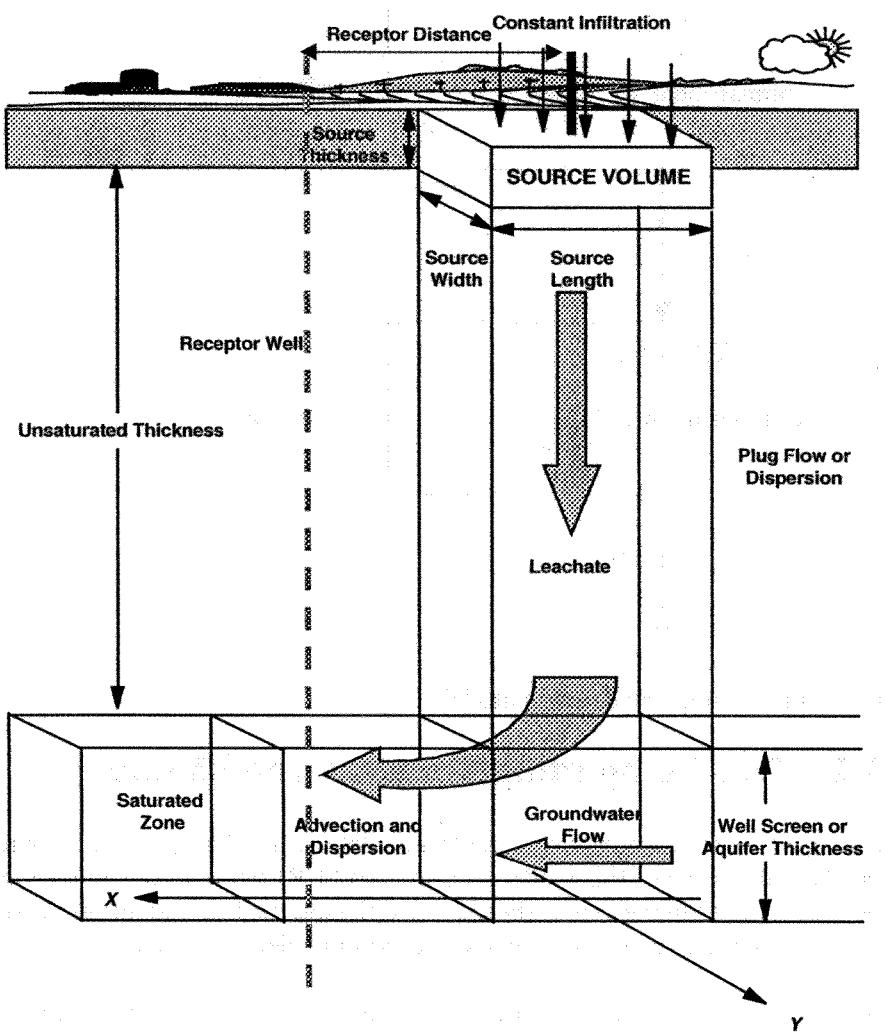


Figure A-3. GWSCREEN conceptual model simulated for the verification runs.

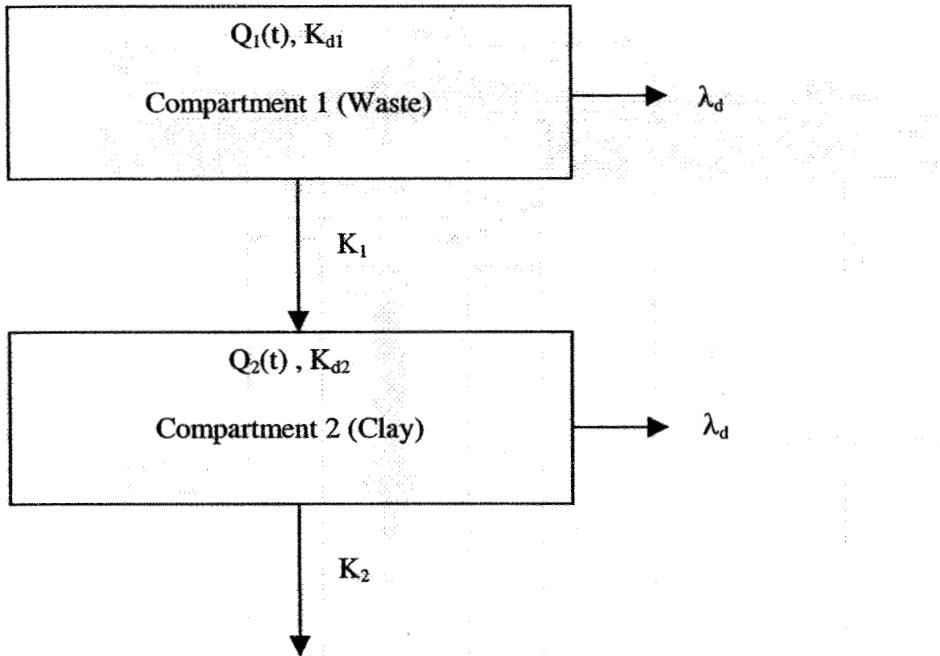


Figure A-4. Schematic of the 2 component source model.

A.2.1 Two-Compartment Source Term Model

As discussed above, a two-compartment source term model was used to generate a source term for input to GWSCREEN. The advantage of this model over the GWSCREEN built in soil source model is that different K_d values can be used in the waste, the clay, and the interbeds in the unsaturated zone. The basic equations and solution for the two-compartment source term model are presented in this section.

Figure A-4 is a schematic of the conceptual model for a two-compartment source term leaching model. The following system of ordinary equations describes the two-compartment source term leaching model.

The leach rate constants are calculated by solving the following system of ordinary differential equations.

$$\frac{dQ_1}{dt} = -(K_1 + \lambda_d)Q_1 \quad (A-1)$$

$$\frac{dQ_2}{dt} = -(K_2 + \lambda_d)Q_2 \quad (A-2)$$

$$Q_1(t = 0) = Q_0 \quad (A-3)$$

$$Q_2(t = 0) = 0 \quad (A-4)$$

Where,

t = time (y)

$Q_1(t)$ = total activity in compartment 1 (Waste) as a function of time (Ci)

$Q_2(t)$ = total activity in compartment 2 (Clay) as a function of time (Ci)

Q_0 = initial waste inventory (Ci)

K_1 = leach rate constant for layer 1 (y^{-1})

K_2 = leach rate constant for layer 2 (y^{-1})

λ_d = decay rate constant (y^{-1})

The solution to the system of equations is:

$$F(t) = K_2 Q_2(t) \quad (A-5)$$

$$Q_2(t) = \frac{K_1 Q_0}{(K_2 + \lambda_d) - (K_1 + \lambda_d)} (e^{-(K_1 + \lambda_d)t} - e^{-(K_2 + \lambda_d)t}) \quad (A-6)$$

$$K_1 = \frac{P}{T_1 \left(1 + \frac{K_{d1}\rho_1}{\theta_1}\right) \theta_1} \quad (A-7)$$

$$K_2 = \frac{P}{T_2 \left(1 + \frac{K_{d2}\rho_2}{\theta_2}\right) \theta_2} \quad (A-8)$$

$$\lambda_d = \frac{\ln(2)}{t_{1/2}} \quad (A-9)$$

Where,

$F(t)$ = contaminant flux from compartment 2 to the unsaturated zone (Ci/y)

P = infiltration rate (m/y)

T_1 = thickness of compartment 1 (m)

T_2 = thickness of compartment 2 (m)

K_{d1} = soil to water contaminant distribution coefficient (cm^3/g) in compartment 1

K_{d2} = soil to water contaminant distribution coefficient (cm^3/g) in compartment 2

θ_1 = soil moisture content in compartment 1 (unitless)

θ_2 = soil moisture content in compartment 2 (unitless)

ρ_1 = soil bulk density in compartment 1 (g/cm³)

ρ_2 = soil bulk density in compartment 2 (g/cm³)

$t_{1/2}$ = radioactive decay half life (y)

This solution was coded in an MS Excel spreadsheet and the contaminant flux [$F(t)$] from the clay layer to the unsaturated zone calculated. The flux was then incorporated into the GWSCREEN input file as a user defined source term.

A.3 DESCRIPTION OF THE GWSCREEN VERIFICATION MODEL AND RESULTS

Parameters were chose for the GWSCREEN simulation to be as close as possible to the parameter values used in the STOMP ICDF design simulation. Table A-1 lists the parameters used in for the two-component source term release model and the GWSCREEN simulation.

Table A-1. GWSCREEN output summarizing the input used for the validation run. (loc3cl1.out)

Site Parameters		
Source Length (m):	1.600E+02	Source Width (m): 1.940E+02
Percolation Rate (m/y):	1.740E-02	
Concentration Vs Time Results for Receptor X = 1.58000E+02 Y = 0.00000E+00		
Source Term and Infiltration Parameters		
Percolation Rate (m/y):	1.740E-02	Initial Inventory (Ci) 9.86E-01
Waste Thickness (m):	1.256E+01	Clay Thickness (m) 0.9
Waste Bulk Density (g/cc):	1.946E+00	Clay Bulk Density (g/cc): 1.586E+00
Waste sorp. coeff.(Kd) cc/g)	0.000E+00	Clay sorp. coeff.(Kd)(cc/g) 1.00E+00
Waste Moisture Content:	1.300E-01	Clay Moisture Content: 3.90E-01
Unsaturated Zone Parameters		
Unsat Zone Thickness (m):	2.746E+01	Unsat Bulk Density: 1.360E+00
Unsat Alpha (1/m):	1.066E+00	Unsat n: 1.523E+00
Saturated K in Unsat (m/y):	2.114E+01	Porosity of Unsat Zone: 4.870E-01
Unsat Residual Moisture:	7.200E-02	Unsat Dispervisity (m): 5.000E+00
Aquifer Zone Parameters		
Longitudinal Disp (m):	6.000E+00	Transverse Disp (m): 1.000E-02
Vertical Dispervisity (m):	3.000E+00	
Aquifer Thickness (m):	7.600E+01	Well Screen Thickness (m): 5.000E+00
Darcy Velocity (m/y):	2.190E+01	Aquifer Porosity: 6.000E-02

Table A-1. (continued).

Bulk Density (g/cc):	2.491E+00
Calculated Flow Parameters	
Percolation Water Flux (m ³ /y):	5.4010E+02
Unsaturated Moisture Content:	2.5928E-01
Unsat Pore Velocity (m/y):	6.7110E-02
Aquifer Pore Velocity (m/y):	3.6500E+02
Longitudinal Disp. (m ² /y):	2.1900E+03
Transverse Disp. (m ² /y):	3.6500E+00
Vertical Disp (m ² /y):	1.0950E+03
Contaminant Data	
Contaminant Name:	I129
Number of Progeny:	0
Half Life (y):	1.570E+07
Other Source Loss Rate (1/y):	0.000E+00
Release File Name:	claykd1.dat
Kd Unsat (ml/g):	0.000E+00
Kd Aquifer (ml/g):	0.000E+00

RESULTS OF THE VALIDATION SIMULATION FOR THE GWSCREEN AND STOMP MODELS

Results of the GWSCREEN validation simulation are shown in Figure A-5. In general, the shapes of the solutions are similar. However, the peak STOMP predictions are somewhat larger than the GWSCREEN predictions and occur earlier in time. Since the conceptual models are not exactly the same, the difference in results is expected. The difference in results is probably due to a combination of the following. However, no simulations have been performed to test these hypotheses.

1. Slight differences in the moisture content in the waste, clay, and interbeds between the two models. The STOMP model simulates spatially variable moisture content through the vadose zone. The GWSCREEN defines a fixed moisture content over each layer.
2. STOMP's initial soil moisture conditions are based on a 0.01m/y infiltration rate. The transient effects of changes in the moisture content early in the modeling cannot be reproduced with GWSCREEN.

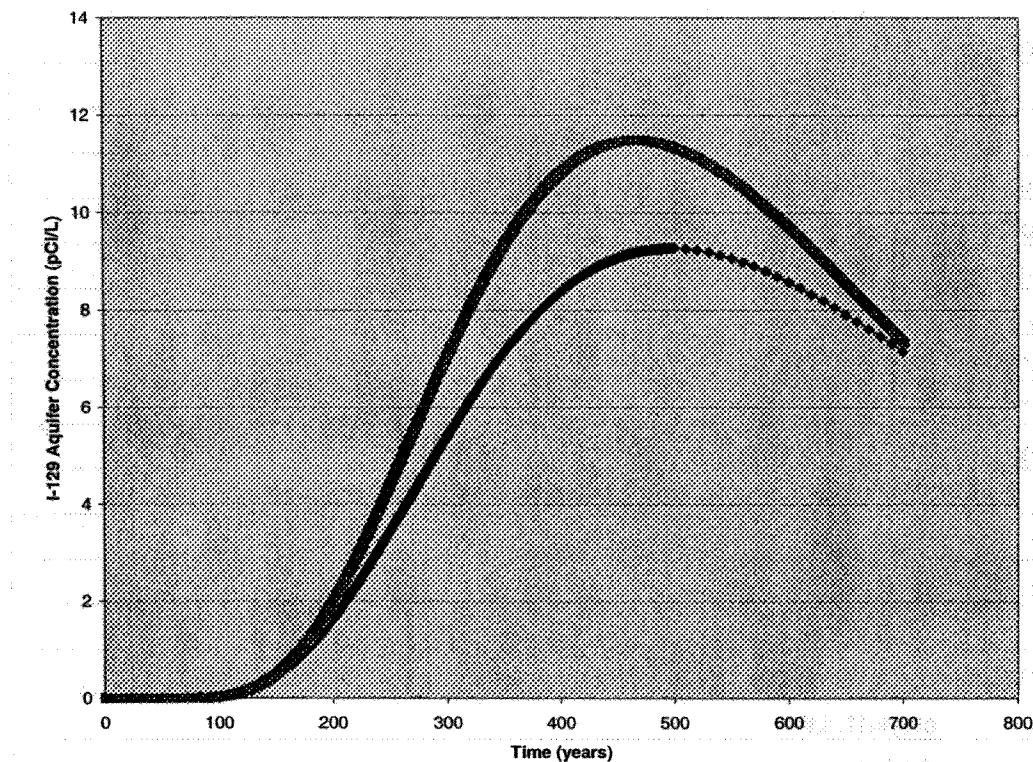


Figure A-5. Comparison of the STOMP ICDF design simulation and GWSCREEN verification results.

In the following section, the results of the ICDF design simulation and verification are presented. The ICDF design simulation was run using the STOMP model, and the verification was run using the GWSCREEN model. The results show that both models predict similar results, indicating that the ICDF design simulation is valid.

The following section presents the results of the ICDF design simulation and verification. The results show that both models predict similar results, indicating that the ICDF design simulation is valid.

The following section presents the results of the ICDF design simulation and verification. The results show that both models predict similar results, indicating that the ICDF design simulation is valid.

A.4 REFERENCES

- PNNL, 2000, *Subsurface Transport Over Multiple Phases Description “STOMP” User’s Guide*, PNNL-12034, Pacific Northwest National Laboratory, Richland, Washington,
- PNNL, 1996, *Subsurface Transport Over Multiple Phases Description “STOMP” Theory Guide*, PNNL-11217, Pacific Northwest National Laboratory, Richland, Washington.
- Rood, A. S., 1999, *GWSCREEN: A Semi-Analytical Model for Assessment of the Groundwater Pathway from Surface or Buried Contamination: Version 2.0 Theory and User’s Manual*, INEEL/EXT-98-00750, Rev. 1, Idaho National Environmental Laboratory, Idaho Falls, Idaho.

Appendix B

Evaluation of Design Concentrations as Compared to the Remedial Action Objectives

Appendix B

Evaluation of Design Concentrations as Compared to the Remedial Action Objectives

B.1 PURPOSE

The purpose of this appendix is to provide an evaluation of the design inventory constituents and concentrations in the "INEEL CERCLA Disposal Facility Design Inventory" Engineering Design File (EDF-ER-264) as compared to the Remedial Action Objectives (RAOs) defined in the OU 3-13 Record of Decision (DOE-ID 1999). This evaluation will provide the basis for consideration of further adjustments, if necessary, in the waste acceptance criteria for the INEEL CERCLA Disposal Facility (ICDF).

B.2 REQUIREMENTS OR GIVENS

B.2.1 Design Inventory

The design inventory constituents and associated site-specific concentrations are published in the "INEEL CERCLA Disposal Facility Design Inventory" (EDF-ER-264). All constituents identified in the Design Inventory will be considered in this evaluation. The design inventory concentrations (C_{DI}) provide the starting point for evaluating the RAOs and determining acceptable concentrations.

B.2.2 Remedial Action Objective

The RAO provides the basis for calculating the required concentration based criteria. The RAO specific to the ICDF is stated in the OU 3-13 Record of Decision (ROD) (DOE-ID 1999, page 8-2) as:

"Maintain caps placed over contaminated soil or debris areas that are contained in place and the closed ICDF-complex, to prevent the release of leachate to underlying groundwater which would result in exceeding a cumulative carcinogenic risk of 1E-4, a total HI of 1; or applicable State of Idaho groundwater quality standards (i.e., MCLs) in the SRPA."

This RAO provides the basis for developing three criteria:

- Cumulative excess lifetime carcinogenic risk (ELCR) in groundwater of 1E-4
- Total non-carcinogenic hazard index (HI) in groundwater of 1
- Achieving the maximum contaminant levels (MCLs) in groundwater (e.g., individual constituents, total alpha of 15 pCi/L).

B.2.3 Background Concentrations

Idaho National Engineering and Environmental Laboratory (INEEL) background constituents and concentrations are evaluated and presented in *Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory* (INEEL 1994). For the purposes of these calculations, the 95%/95% Upper Tolerance Limits are used as presented in Tables 22 and 24. This is consistent with the background values referenced in the ROD (DOE/ID 1999).

B.2.4 Constituent Half Life

The constituents radiological or environmental half life in years is referenced as follows. The radionuclide half-lives were gathered from:

- CRC Handbook of Chemistry and Physics (CRC 1995)
- EPA's "Radionuclide Carcinogenicity Slope Factors," Health Effects Assessment Summary Tables (HEAST) - Radionuclides Table (EPA 2001a).

The non-radiological half lives were gathered from a number of websites and other references:

- ChemFinder.com 2001
- Spectrum Laboratories, Inc., 2001
- International Programme on Chemical Safety INCHEM, Behavior and Determination of Volatile Organic Chemicals in Soil, A Literature Review (EPA 1993)
- ARS Pesticide Properties Database 2001
- The Handbook of Environmental Degradation Rates (Howard et al. 1991).
- Handbook of Environmental Data on Organic Chemicals (Verschueren 2001).

B.3 METHODOLOGY AND IMPLEMENTATION

B.3.1 Evaluate Background Concentrations

The design inventory concentrations (C_{DI}) are compared with background concentrations. Those constituents that have a concentration less than background are eliminated from the risk evaluations (i.e., carcinogenic and non-carcinogenic evaluations). There are 15 constituents eliminated from the risk evaluations based on this comparison. They are shown in Table B-1. These 15 constituents will not be evaluated with respect to the carcinogenic or non-carcinogenic risks. These constituents will remain in the MCL evaluation.

Table B-1. Constituents with $C_{DI} <$ Background

Ra228	Calcium	Nickel
Aluminum	Cobalt	Potassium
Arsenic	Iron	Sodium
Barium	Magnesium	Thallium
Beryllium	Manganese	Vanadium

B.3.2 Determine Constituent Groundwater Concentrations

The concentration (C_T) versus time (T) is calculated for all design inventory constituents. The constituent concentration (C_T) in groundwater for each time step at time "T" is calculated based on

equations (B-1) and (B-2). A summary of the input parameters is provided in Table B-2 at the end of this appendix.

$$C_T = [(C_{DI}) (DAF_T/1000) (e^{-\gamma T})] \quad (B-1)$$

Where,

C_T	Concentration at time "T" (units - pCi/L or mg/L)
C_{DI}	Concentration at original design inventory provided in EDF-ER-264 Note: convert Ci/kg to pCi/kg for radionuclides (units - pCi/kg or mg/kg)
DAF_T	Dilution / Attenuation Factor at time "T" as modeled in the fate and transport studies (EDF-ER-275). The surrogate dilution/attenuation factor (DAF) is selected based on the constituents weighted average vadose zone K_d . Note: equation includes conversion to kg/L (units - kg/m ³)
$e^{-\gamma T}$	Decay Factor, where: (Note: 1 is entered if the constituent does not decay) (unitless)
e	2.718
γ	Lamda, see equation (B-2) (units - years)
T	Time provided in the fate and transport modeling results (units - years)

$$\gamma = \ln 2 / t \quad (B-2)$$

Where,

$\ln 2$	0.6931
t	Constituent half life (units - years)

B.3.2.1. Weighted Average K_d

The weighted average K_d is selected as an indicator of the relative mobility of specific contaminants in the vadose zone within and beneath the ICDF. The value is computed by summing the results of multiplying the fractional vadose zone thickness of each stratigraphic unit by the contaminant-specific K_d for each unit. The weighted average K_d is used to group constituents with similar anticipated travel times through the vadose zone.

$$K_d \text{ weighted average} = \sum (K_d * \text{fractional thickness})_{\text{stratigraphic unit}} \quad (B-3)$$

Thickness of each unit divided by the total cross-section (EDF-ER-275), where:

Where,

K_d

Distribution coefficient representing the tendency for a substance to adsorb to soil. The greater the K_d value, the greater the extent of adsorption in soil. The K_d s for non-organics are provided in a letter from Talley Jenkins^a (Units – mL/g)

Fractional Thickness

Thickness of each unit divided by the total cross-section (EDF-ER-275), where:
(unitless)

Stratigraphic Unit	Thickness (m)	Fraction
Waste soils	12.56	0.085
Operations layer	0.9	0.006
Clean alluvium	1.52	0.010
Clay materials	0.9	0.006
Interbed materials	23.8	0.161
Vadose zone basalt	107.9	0.731
Total Thickness	147.58	

The K_d for organic constituents is determined through the use of equation (B-4). This K_d is substituted into equation (B-3) in support of the weighted average K_d calculation.

$$K_d = K_{oc} * \text{Organic Carbon Fraction} \quad (\text{B-4})$$

Where,

K_{oc}

Organic Carbon partitioning coefficient (La Grega, et al, 1994, EPA 2000; ORNL 2001)
(Units – mL/g)

Organic Carbon Fraction

The fraction of organic carbon in each stratigraphic unit (Colwell 1988), where:
(unitless)

	Stratigraphic Unit	Fractional Thickness
	Waste soils	0.0025
	Operations layer	0.0025
	Clean alluvium	0.0025
	Clay materials	0
	Interbed materials	0.0005
	Vadose zone basalt	0

^a Jenkins, T., DOE, letter to Martin Doornbos, BBWI, July 3, 2001, K_d values for INTEC groundwater modeling (EM-ER-01-115).

B.3.2.2.

Dilution/Attenuation Factors

The dilution/attenuation factor (DAF) is determined based on the Subsurface Transport Over Multiple Phases (STOMP) Model discussed and presented in EDF-ER-275. The STOMP Model utilized eight surrogate constituent K_d s that are representative of the K_d range of all design inventory constituents. The model output provided in support of this process includes the DAF. The application of the various DAFs is based on the weighted average K_d .

Where,

DAF

Dilution / Attenuation Factor, modeled in the fate and transport studies (EDF-ER-275) The surrogate application to a specific constituent is identified below. (Units - kg/L)

- | | |
|--|----------------------|
| If weighted average $K_d < 0.006$, or if K_d not listed | Then use surrogate 1 |
| If weighted average $0.006 \leq K_d < 0.058$ | Then use surrogate 2 |
| If weighted average $0.058 \leq K_d < 1.950$ | Then use surrogate 3 |
| If weighted average $1.950 \leq K_d < 2.426$ | Then use surrogate 4 |
| If weighted average $2.426 \leq K_d < 4.464$ | Then use surrogate 5 |
| If weighted average $4.464 \leq K_d < 18.592$ | Then use surrogate 6 |
| If weighted average $18.592 \leq K_d < 91.120$ | Then use surrogate 7 |
| If weighted average $K_d \geq 91.120$ | Then use surrogate 8 |

B.3.3 Constituent Concentration Over Time

The above calculations are utilized to determine the individual constituent concentrations over time. The maximum concentration of each constituent over the period of evaluation is provided in Table B-3 at the end of this appendix.

B.3.4 Compare C_T to the Remedial Action Objectives

The three key components to the RAOs include cumulative excess lifetime carcinogenic risk, cumulative hazard index, and MCLs. The input parameters to support the comparison of the design inventory to the RAOs is provided in Table B-4 at the end of this appendix.

B.3.4.1.

Cumulative Excess Lifetime Carcinogenic Risk

A RAO Risk ($R_{RISK@T}$) versus time (T) is calculated for each individual design inventory constituent that potentially poses a carcinogenic risk. Note that those constituents with a C_{DI} less than background are not included in this evaluation. The R_{RISK} in groundwater at time (T) is calculated based on equation (B-5).

$$R_{RISK@T} = C_T / \text{Risk Factor} \quad (\text{B-5})$$

Where,

$R_{RISK@T}$

Carcinogenic risk of an individual constituent at time "T"
(unitless)

C_T

Concentration at time "T" as calculated by equation (B-1)
(units - pCi/L or mg/L)

Risk Factor

The risk per unit concentration as defined by equation (B-6)
(units - pCi/L or mg/L)

The Risk Factor is calculated based on equation (B-6):

$$\text{Risk Factor} = \text{RBC} / \text{TR} \quad (\text{B-6})$$

Where,

Risk Factor

The risk associated with 1 unit concentration
(units - pCi/L or mg/L)

RBC

Individual carcinogenic risk-based concentrations (RBC) representing an
ELCR of 1×10^{-4} as defined in Appendix C.
(units - pCi/L or mg/L)

TR

Target risk defined as 1×10^{-4}
(unitless)

The cumulative RAO Risk ($R_{\Sigma RISK}$) versus time (T) curve representing the sum of each $R_{RISK@T}$ for each individual design inventory constituent representing a carcinogenic risk using the design recharge rate of 0.0001 m/year. The $R_{\Sigma RISK}$ in groundwater for each time (T) is calculated based on equation (B-7). The curve is prepared by graphing the $R_{\Sigma RISK}$ versus T as shown in Figure B-1. The figure includes a line indicating the acceptable cumulative carcinogenic risk value of 1E-4. As indicated on this figure, the C_T values are protective based on this RAO.

$$R_{\Sigma RISK} = \sum R_{RISK@T} \quad (\text{B-7})$$

B.3.4.2. Hazard Index

A RAO HI ($R_{HI@T}$) versus time (T) is calculated for each individual design inventory constituent that potentially poses a non-carcinogenic health effect. Note that those constituents with a C_{DI} less than background are not included in this evaluation. The R_{HI} in groundwater for each time (T) is calculated based on equation (B-8).

Cumulative 1E-4 Risk Curve

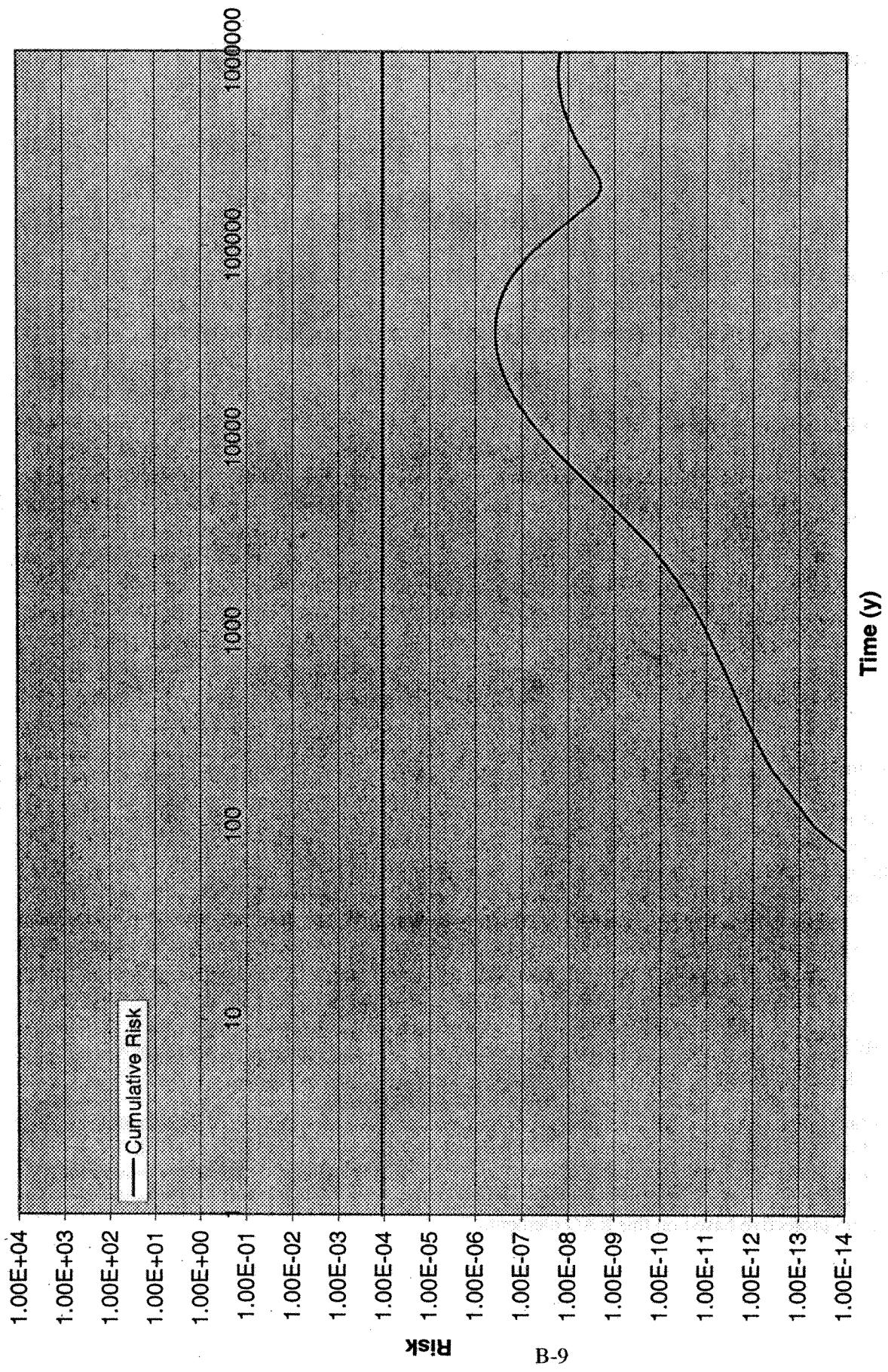


Figure B-1. Cumulative Excess Lifetime Carcinogenic Risk over Time..

$$R_{HI@T} = C_T / \text{Risk Factor} \quad (B-8)$$

Where:

$R_{HI@T}$	Non-carcinogenic HI of an individual constituent at time "T" (unitless)
C_T	Concentration at time "T" as calculated by equation (B-1) (units - pCi/L or mg/L)
Risk Factor	The risk associated with 1 unit concentration as defined by equation (B-9) (units – pCi/L or mg/L)

The Risk Factor is calculated based on the following equation:

$$\text{Risk Factor} = \text{RBC} / \text{THI} \quad (B-9)$$

Where:

Risk Factor	The risk associated with 1 unit concentration (units – pCi/L or mg/L)
RBC	Individual non-carcinogenic RBC representing a HI of 1 as defined in Appendix C. (units – pCi/L or mg/L)
THI	Target HI defined as 1 (unitless)

The cumulative RAO Hazard Index ($R_{\Sigma HI}$) versus time (T) curve representing the sum of each individual design inventory constituent representing a non-carcinogenic risk using the design recharge rate of 0.0001 m/year. The $R_{\Sigma HI}$ in groundwater for each time (T) is calculated based on equation (B-10). The curve is prepared by graphing the $R_{\Sigma HI}$ versus T as shown in Figure B-2. The graph includes a line indicating the acceptable cumulative non-carcinogenic hazard index of 1. As indicated on this figure, the C_T values are protective based on this RAO.

$$R_{\Sigma HI} = \sum R_{HI@T} \quad (B-10)$$

B.3.4.3. Individual and Cumulative MCLs

The MCL RAO addresses four key elements for evaluation; individual constituents, total alpha particles, beta particles and photon emitters, and Ra-226 and Ra-228 combined.

1. Individual Constituents. The MCL limit for each constituent is based on U.S. Environmental Protection Agency's (EPA's) website at www.epa.gov/safewater/mcl.html (EPA 2001b). These limits are compared to the C_T maximum values over the evaluation period. Table B-5 provides both values for comparative purposes at the end of this appendix. As indicated by this table, the C_T values are protective based on this RAO element.

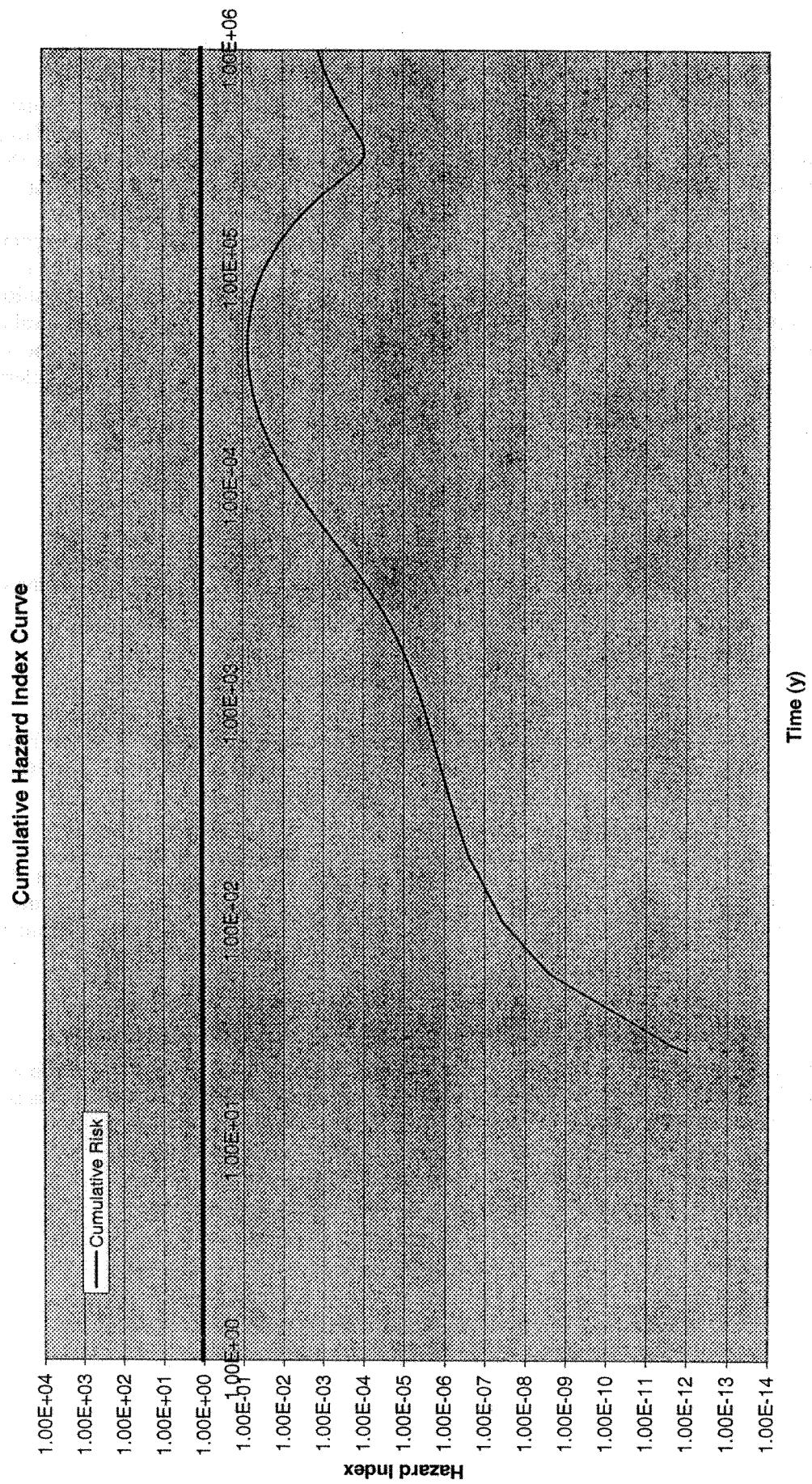


Figure B-2. Cumulative Hazard Index over Time.

2. Total Alpha Particles not to exceed 15 pCi/L. Alpha particle emitters have a cumulative MCL of 15 pCi/L. All alpha emitters were identified and concentrations were accumulated to evaluate the cumulative value as shown in Figure B-3. The graph includes a line indicating the 15 pCi/L limit. As indicated on this figure, the C_T values are protective based on this RAO element.
3. Beta particles and photon emitters not to exceed 4 mrem/year. Beta particles and photon emitters have a cumulative MCL of 4 mrem/yr total dose to an organ, factoring in potential total body accumulation. Per EPA guidance (EPA 1991), this calculation is based on the equation (B-11). All beta particles and photon emitters were identified and calculations were made to evaluate the cumulative values as shown on Figure B-4. The graph includes a line indicating the 4 mrem/year limit. As indicated on this figure, the C_T values are protective based on this RAO element.

$$\text{Dose}_{\text{Organ } X} = \left(C_{T}^A / C_4^A \right) + \left(C_{T}^B / C_4^B \right) + \dots + \left(C_{T}^N / C_4^N \right) \times 4 \text{ mrem/year} \quad (\text{B-11})$$

Where:

$\text{Dose}_{\text{Organ } X}$	Dose specific to the organ (note that the total body dose must be included to ensure accurate cumulative affects.) (units = mrem/year)
C_{T}^A	Concentration of the specific isotope "A" at a time "T" (units = pCi/L)
C_4^A	The 4 mrem/year dose equivalent concentration for organ "X" of isotope "A" at time "T." Values are provided in EPA guidance (EPA 1976). (units = pCi/L)

4. Combined Ra-226 and Ra-228 not to exceed 5 pCi/L. The fourth and final element of the MCL elements is the cumulative MCL for Ra-226 and Ra-228 of 5 pCi/L. Based on the maximum values presented in Table B-3, the cumulative value of these two isotopes is well under the 5 pCi/L range. As such, the C_T values are protective based on this RAO elements.

B.4 CONCLUSIONS

The RAOs are achieved based on the design inventory concentrations as modeled in groundwater. Based on this evaluation, it is anticipated that the constituent concentration inventory for acceptance at the ICDF will be increased beyond that of the original design inventory concentrations.

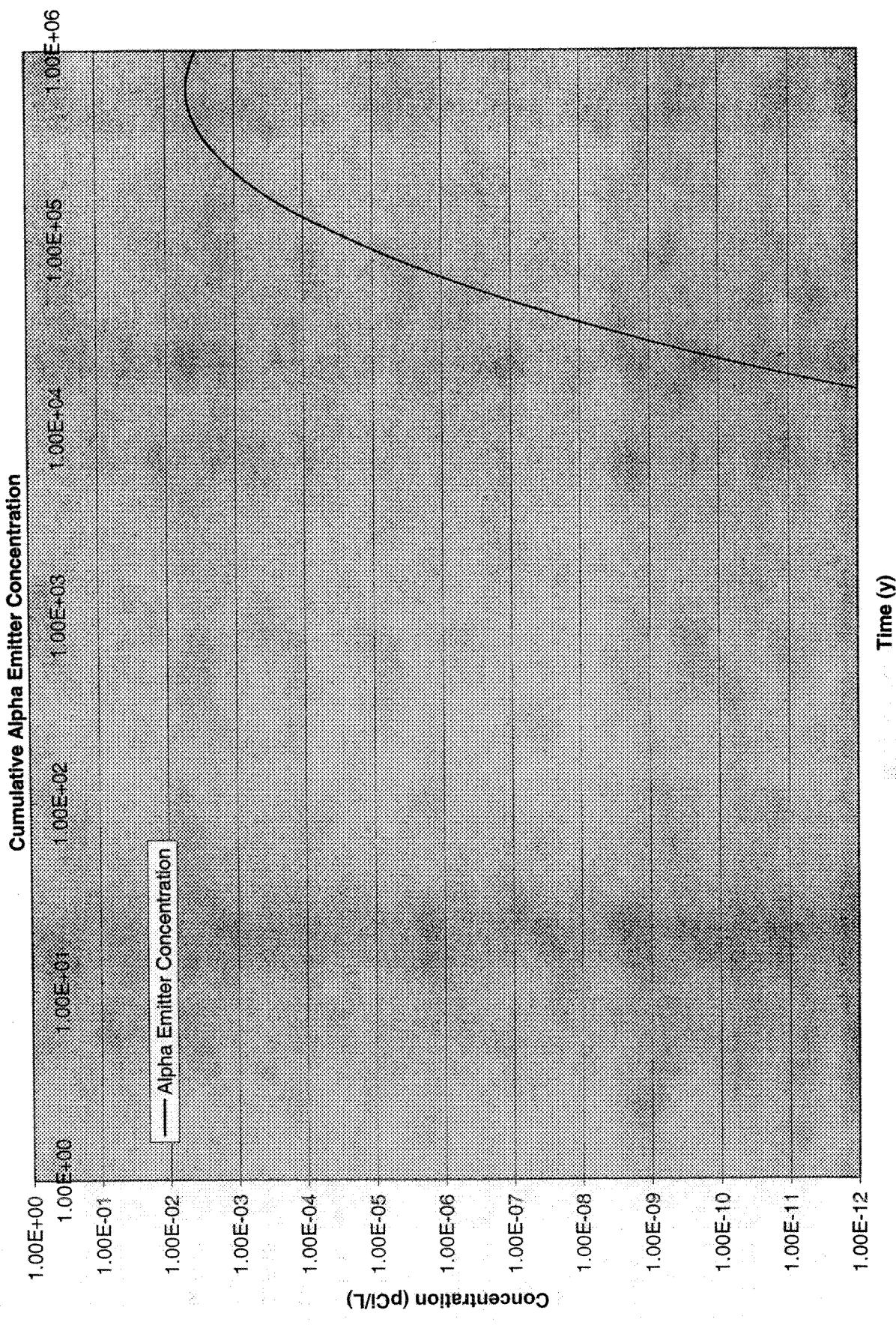


Figure B-3. Cumulative Total Alpha Summary over Time.

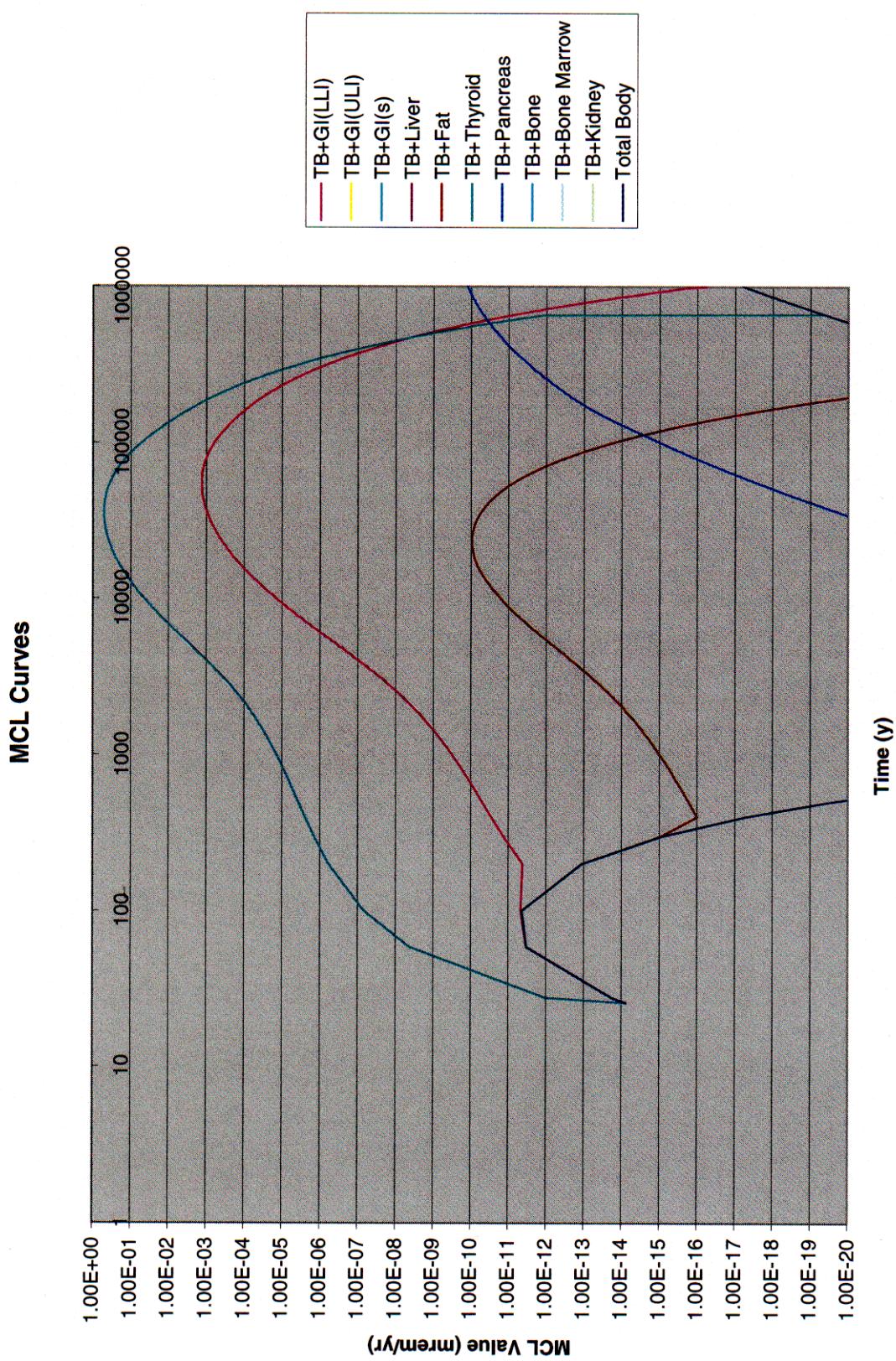


Figure B-4. Total beta particle and photon emitter dose summary over time.

B.5 REFERENCES

- ARS Pesticide Properties Database, 2001, <http://wizard.arsusda.gov/acsl/textfiles>, website visited November 2001.
- ChemFinder.com, 2001, <http://chemfinder/cambridgesoft.com>, website visited November 2001.
- Colwell, F.S., 1988, *Final Report: Microbial Examination of RWMC Surface And Subsurface Soils and Biodegradation of Low Molecular Weight Hydrocarbons Using Microorganisms Indigenous to RWMC*, ST-BEG-03-88, EG&G Idaho, Inc.
- CRC, 1995, *Handbook of Chemistry and Physics*, 82nd edition, CRC Press, Boca Raton, Florida.
- DOE-ID, 1999, *Final Record of Decision, Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13*, DOE/ID-10660, Rev. 0, Department of Energy Idaho Operations Office, Idaho Falls, Idaho, U.S. Environmental Protection Agency Region 10, and State of Idaho Department of Health and Welfare.
- EDF-ER-264, 2001, "INEEL CERCLA Disposal Facility Design Inventory," Rev. A, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, March 2001.
- EDF-ER-275, 2001, "Fate and Transport Modeling Results," Rev. 2, Draft A, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, October 2001.
- EPA, 2001a, "Radionuclide Carcinogenicity Slope Factors," Health Effects Assessment Summary Tables (HEAST) - Radionuclides Table <http://www.epa.gov/radiation/heast>, website visited November 2001.
- EPA 2001b, <http://www.epa.gov/safewater/regs.html>, website visited September 2001.
- EPA, 2000, Region IX Preliminary Remediation Goal Chemical-Physical Data Table, <http://www.epa.gov/docs/region09/waste/sfund/prg/index.html>, website visited November 2001.
- EPA, 1991, *Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals)*, EPA/540/R-92/003, Environmental Protection Agency.
- EPA 1976, *National Interim Primary Drinking Water Regulations*, EPA-570/9-76-003, Office of Water Supply, Environmental Protection Agency.
- EPA, 1993, "International Programme on Chemical Safety INCHEM, Behavior and Determination of Volatile Organic Chemicals in Soil," *A Literature Review*, U.S. Environmental Protection Agency.
- Howard, et al., 1991, The Handbook of Environmental Degradation Rates.
- INEEL, 1994, Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory, INEL-94/0250, Rev. 1, Idaho National Environmental and Engineering Laboratory.

La Grega, M.D., Buckingham, P. L, Evans, J. C., 1994, *Hazardous Waste Management*, McGraw-Hill, Inc., New York

ORNL, 2001, Risk Assessment Information System, Chemical-Specific Factors (Koc) Oak Ridge National Laboratory, <http://risk.lsd.ornl.gov>, website visited September 2001.

Spectrum Laboratories, Inc., 2001, <http://www.speclab.com/elements>, website visited November 2001.

Verschueren K, 2001, Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York

The following information is from the Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York. It is intended to provide environmental data on organic chemicals. The data presented here is not necessarily the most recent available. The data is provided "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The user is responsible for determining the appropriateness of the data for their own needs. The data is not guaranteed to be complete or accurate and may not reflect the most current information available. The user is responsible for any damages resulting from the use of this data.

The following information is from the Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York. It is intended to provide environmental data on organic chemicals. The data presented here is not necessarily the most recent available. The data is provided "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The user is responsible for determining the appropriateness of the data for their own needs. The data is not guaranteed to be complete or accurate and may not reflect the most current information available. The user is responsible for any damages resulting from the use of this data.

The following information is from the Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York. It is intended to provide environmental data on organic chemicals. The data presented here is not necessarily the most recent available. The data is provided "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The user is responsible for determining the appropriateness of the data for their own needs. The data is not guaranteed to be complete or accurate and may not reflect the most current information available. The user is responsible for any damages resulting from the use of this data.

The following information is from the Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York. It is intended to provide environmental data on organic chemicals. The data presented here is not necessarily the most recent available. The data is provided "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The user is responsible for determining the appropriateness of the data for their own needs. The data is not guaranteed to be complete or accurate and may not reflect the most current information available. The user is responsible for any damages resulting from the use of this data.

The following information is from the Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York. It is intended to provide environmental data on organic chemicals. The data presented here is not necessarily the most recent available. The data is provided "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The user is responsible for determining the appropriateness of the data for their own needs. The data is not guaranteed to be complete or accurate and may not reflect the most current information available. The user is responsible for any damages resulting from the use of this data.

The following information is from the Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York. It is intended to provide environmental data on organic chemicals. The data presented here is not necessarily the most recent available. The data is provided "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The user is responsible for determining the appropriateness of the data for their own needs. The data is not guaranteed to be complete or accurate and may not reflect the most current information available. The user is responsible for any damages resulting from the use of this data.

The following information is from the Handbook of Environmental Data on Organic Chemicals, 4th edition, Wiley-Interscience, John Wiley & Sons, Inc. Scientific, Technical, and Medical Division, 605 Third Avenue, New York, New York. It is intended to provide environmental data on organic chemicals. The data presented here is not necessarily the most recent available. The data is provided "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The user is responsible for determining the appropriateness of the data for their own needs. The data is not guaranteed to be complete or accurate and may not reflect the most current information available. The user is responsible for any damages resulting from the use of this data.

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{DI})	Organic Carbon Partition Coefficient (K _{OC})			Operations Layer K _d	Clean Alluvium K _d			Interbeds Materials K _d	Vadose Zone Basalt K _d	Weighted Average K _d	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(yr)	Surrogates
		(pCi/kg or mg/kg)	(mL/g)	(mL/g)		(mL/g)	(mL/g)	(mL/g)										
Ac225	5.12E-05	NA	4.5E-02	4.5E+02	4.5E+02	2.4E+03	4.5E+02	0.0E+00	1.3E+02	2.7E-02	8							
Ac227	2.04E-02	NA	4.5E-02	4.5E+02	4.5E+02	2.4E+03	4.5E+02	0.0E+00	1.3E+02	2.2E+01	8							
Ac228	1.52E-07	NA	4.5E+02	4.5E+02	4.5E+02	2.4E+03	4.5E+02	0.0E+00	1.3E+02	7.0E-04	8							
Ag106	0.00E+00	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	0.0E+00	2.5E+01	4.6E-05	7							
Ag108	3.69E-06	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	0.0E+00	2.5E+01	4.5E-06	7							
Ag108m	8.00E+02	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	0.0E+00	2.5E+01	1.3E+02	7							
Ag109m	4.92E-09	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	0.0E+00	2.5E+01	1.3E-06	7							
Ag110	5.18E-08	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	0.0E+00	2.5E+01	7.8E-07	7							
Ag110m	5.55E-06	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	0.0E+00	2.5E+01	6.8E-01	7							
Ag111	0.00E+00	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	0.0E+00	2.5E+01	2.0E-02	7							
Am241	2.38E+04	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	4.3E+02	8							
Am242	4.53E-02	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	1.8E-03	8							
Am242m	4.52E-02	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	1.5E+02	8							
Am243	3.34E-01	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	7.4E+03	8							
Am245	0.00E+00	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	9.1E+01	2.3E-04	8						
Am246	1.38E-22	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	7.4E-05	8							
At217	5.12E-05	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.0E-03	1.0E-09	1							
Ba136m	0.00E+00	NA	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	0.0E+00	5.0E+01	9.8E-09	6							
Ba137m	2.31E+07	NA	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	0.0E+00	5.0E+01	1.3E+01	4.9E-06	6						
Ba140	0.00E+00	NA	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	0.0E+00	5.0E+01	1.3E+01	3.5E-02	6						
Be10	1.14E-03	NA	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	1.3E+03	2.5E+02	7.3E+01	1.5E+06	7						
Bi210	1.09E-03	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	1.4E-02	7						
Bi211	1.83E-02	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	4.1E-06	7						
Bi212	5.53E-01	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	1.2E-04	7						
Bi213	0.00E+00	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	8.7E-05	7						
Bi214	5.62E-03	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	3.8E-05	7						
Bi218	2.16E-18	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	1.1E+03	8.8E-01	8						
Bk249	7.75E-23	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	3.7E-04	8						
C14	4.61E-02	NA	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.7E+03	3						
Cd109	4.92E-09	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	1.3E+00	6						
Cd113m	1.62E+03	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	4.9E+00	1.4E+01	6					
Cd115m	4.25E-51	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	4.9E+00	1.2E-01	6					
Ce141	1.80E-68	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	2.5E+02	8.9E-02	8					
Ce142	0.00E+00	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	2.5E+02	3.8E-03	8					
Ce144	1.81E+00	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	2.0E+02	7.8E-01	8					
Cf249	4.12E-13	NA	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	1.4E+02	3.5E+02	8					
Cf250	2.11E-13	NA	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	1.3E+01	1.4E+02	8					
Cf251	9.52E-16	NA	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	0.0E+00	9.0E+02	8					

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{Dr})	Organic Carbon Partition			Operations Layer			Clean Alluvium			Vadose Zone			Weighted Average	
		Waste Soils K _d	Coefficient (K _{oc})	(mL/g)	K _d	(mL/g)	K _d	(mL/g)	Clay Materials K _d	(mL/g)	Interbeds Materials K _d	(mL/g)	Weighted Average K _d	(mL/g)	Half-Life (yr)
Cf252	2.24E-17	NA	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	0.0E+00	1.4E+02	2.6E+00	0.0E+00	1.4E+02	2.6E+00	8	
Cm241	1.30E-77	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	9.0E-02	8	
Cm242	5.39E-14	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	4.5E-01	8	
Cm243	3.55E-03	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	2.9E+01	8	
Cm244	1.80E+00	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	1.8E+01	8	
Cm245	8.02E-05	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	8.5E+03	8	
Cm246	1.79E-06	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	4.7E+03	8	
Cm247	6.39E-13	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	1.6E+07	8	
Cm248	1.95E-13	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	3.4E+05	8	
Cm250	5.53E-22	NA	4.0E+03	4.0E+03	4.0E+03	4.0E+03	4.0E+03	6.0E+03	4.0E+03	4.0E+03	0.0E+00	1.1E+03	9.7E+03	8	
Co-57	3.69E+00	NA	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	0.0E+00	5.9E+00	7.4E-01	6	
Co-58	5.88E-14	NA	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	0.0E+00	5.9E+00	1.9E-01	6	
Co-60	1.93E+05	NA	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	0.0E+00	5.9E+00	5.3E+00	6	
Cr-51	2.30E-51	NA	3.0E+01	3.0E+01	3.0E+01	3.0E+01	3.0E+01	3.0E+01	3.0E+01	3.0E+01	0.0E+00	1.7E+01	7.6E-02	6	
Cs132	0.00E+00	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	0.0E+00	1.4E+02	1.8E-02	8	
Cs134	1.12E+04	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	0.0E+00	1.4E+02	2.1E+00	8	
Cs135	3.58E+01	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	0.0E+00	1.4E+02	2.3E+06	8	
Cs136	0.00E+00	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	0.0E+00	1.4E+02	3.6E-02	8	
Cs137	2.44E+07	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	0.0E+00	1.4E+02	3.0E+01	8	
Er169	0.00E+00	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	2.5E-02	7	
Eu150	1.73E-05	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	1.4E-03	8	
Eu152	9.68E+05	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	1.3E+01	8	
Eu154	8.21E+05	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	8.8E+00	8	
Eu155	1.76E-05	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	5.0E+00	8	
Eu156	0.00E+00	NA	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	3.4E+02	0.0E+00	9.1E+01	4.2E-02	8	
Eu157	4.51E-32	NA	2.2E+02	2.2E+02	2.2E+02	2.2E+02	2.2E+02	2.2E+02	2.2E+02	2.2E+02	0.0E+00	5.9E+01	1.2E-01	7	
Fe-59	5.12E-05	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	0.0E+00	9.1E+01	9.1E-06	8	
Fr221	2.82E-04	NA	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	5.0E+02	0.0E+00	1.4E+02	4.1E-05	8	
Fr223	2.72E-11	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	1.1E+14	7	
Gd152	2.70E-08	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	6.6E-01	7	
Gd153	4.96E+04	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E+01	1	
H_3	1.30E+03	NA	4.5E+02	4.5E+02	4.5E+02	4.5E+02	4.5E+02	4.5E+02	4.5E+02	4.5E+02	0.0E+00	0.0E+00	6.0E-03	2	
Hf-181	0.00E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+02	8	
Hol66m	1.89E-51	NA	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	0.0E+00	7.3E+01	3.1E-03	7	
H129	1.97E-51	NA	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	0.0E+00	0.0E+00	6.0E-03	2	
H131	5.78E-09	NA	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	0.0E+00	0.0E+00	6.0E-03	2	
In114	1.97E-51	NA	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	0.0E+00	1.0E+02	1.4E-01	8	
In114m	5.78E-09	NA	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	0.0E+00	1.0E+02	5.1E+15	8	
In115															

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Organic Carbon			Operations Layer			Clean Alluvium			Interbeds Materials K _d			Vadose Zone		
	Design Inventory (C _{Dl})	Partition Coefficient (K _{oc})	Waste Soils K _d	K _d	K _d	K _d	Clay Materials K _d	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(mL/g)	Weighted Average	Half-Life	Surrogates
In115m	0.00E+00	NA	3.9E+02	3.9E+02	3.9E+02	3.9E+02	3.9E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.1E-04	8	
K-40	1.92E+03	NA	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.5E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+09	5	
Kr81	5.30E-06	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E+05	1	
Kr85	1.16E+06	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E+01	1	
La138	0.00E+00	NA	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	3.2E+02	8	
La140	2.65E-102	NA	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	1.2E+03	3.2E+02	8	
Mn-54	1.93E-05	NA	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	4.6E-03	8	
Nb92	6.35E-16	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	8.6E-01	6	
Nb93m	1.35E+01	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.7E+07	7	
Nb94	8.83E-03	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.4E+01	7	
Nb95	4.80E-30	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	2.0E+04	7	
Nb95m	1.84E-32	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	9.6E-02	7	
Nd144	3.27E-07	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	9.9E-03	7	
Nd147	0.00E+00	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.1E+15	7	
Np235	6.80E-08	NA	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	6.4E+01	7	
Np236	6.93E-05	NA	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	3.0E-02	7	
Np237	6.43E+02	NA	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	2.4E+00	5	
Np238	2.18E-04	NA	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	5.8E-03	5	
Np239	3.34E-01	NA	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	1.1E+00	5	
Np240	2.79E-11	NA	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	1.2E+06	5	
Np240m	2.54E-08	NA	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	8.0E+00	2.4E+00	5	
Pa231	6.98E-02	NA	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	1.6E+02	8	
Pa233	4.36E+01	NA	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	7.4E-02	8	
Pa234	2.74E-03	NA	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	1.6E+02	8	
Pa234n	1.71E+00	NA	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	5.5E+02	1.6E+02	8	
Pb209	4.85E-05	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	7	
Pb210	1.09E-03	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	7	
Pb211	1.83E-02	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	7	
Pb212	5.53E-01	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	7	
Pb214	5.62E-03	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	3.0E+01	7	
Pd107	6.12E+00	NA	5.5E+01	5.5E+01	5.5E+01	5.5E+01	5.5E+01	5.5E+01	5.5E+01	5.5E+01	5.5E+01	5.5E+01	1.6E+01	6	
Pm146	5.81E+00	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	6.4E+01	7	
Pm147	3.82E+05	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	7	
Pm148	3.97E-56	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	1.5E+02	7	
Pm148m	8.23E-55	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	6.4E+01	7	
Po210	1.02E-03	NA	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	5.7E+01	7	
Po211	6.84E-07	NA	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	5.7E+01	7	
Po212	3.28E-01	NA	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	1.5E+02	5.7E+01	7	

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{Dl})	Organic Carbon Partition Coefficient (K _{OC})			Operations Layer K _d	Clean Alluvium K _d	Clay Materials K _d	Interbeds Materials K _d	Vadose Zone Basalt K _d	Weighted Average K _d	Half-Life (yr)	Vadose Zone Surrogates
		(pCi/kg or mg/kg)	(mL/g)	(mL/g)								
Po213	4.34E-05	NA	1.5E+02	1.5E+02	1.5E+02	3.0E+03	1.5E+02	0.0E+00	5.7E+01	5.7E+01	1.3E-13	7
Po214	5.62E-03	NA	1.5E+02	1.5E+02	1.5E+02	3.0E+03	1.5E+02	0.0E+00	5.7E+01	5.2E-12	7	7
Po215	1.83E-02	NA	1.5E+02	1.5E+02	1.5E+02	3.0E+03	1.5E+02	0.0E+00	5.7E+01	5.6E-11	7	7
Po216	5.53E-01	NA	1.5E+02	1.5E+02	1.5E+02	3.0E+03	1.5E+02	0.0E+00	5.7E+01	4.8E-09	7	7
Po218	5.62E-03	NA	1.5E+02	1.5E+02	1.5E+02	3.0E+03	1.5E+02	0.0E+00	5.7E+01	5.8E-06	7	7
Pr143	0.00E+00	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	3.7E-02	7	7
Pr144	1.77E+00	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	3.3E-05	7	7
Pr144m	2.53E-02	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	1.4E-05	7	7
Pu236	5.53E-03	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.8E+01	2.9E+00	7	7
Pu237	1.21E-55	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	1.2E-01	7	7
Pu238	2.33E+05	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.8E+01	8.8E+01	7	7
Pu239	6.66E+03	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	2.4E+04	7	7
Pu240	1.50E+03	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	6.5E+03	7	7
Pu241	6.39E+04	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	1.4E+01	7	7
Pu242	2.41E-01	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	3.8E+05	7	7
Pu243	6.39E-13	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	5.7E-04	7	7
Pu244	2.54E-08	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	8.3E+07	7	7
Pu246	1.38E-22	NA	1.4E+02	1.4E+02	1.4E+02	1.7E+03	1.4E+02	0.0E+00	2.2E+01	3.0E-02	7	7
Ra222	1.17E-113	NA	1.0E+02	1.0E+02	1.0E+02	9.1E+03	1.0E+02	0.0E+00	8.1E+01	1.2E-06	7	7
Ra223	2.03E-02	NA	1.0E+02	1.0E+02	1.0E+02	9.1E+03	1.0E+02	0.0E+00	8.1E+01	3.1E-02	7	7
Ra224	5.53E-01	NA	1.0E+02	1.0E+02	1.0E+02	9.1E+03	1.0E+02	0.0E+00	8.1E+01	1.0E-02	7	7
Ra225	5.12E-05	NA	1.0E+02	1.0E+02	1.0E+02	9.1E+03	1.0E+02	0.0E+00	8.1E+01	4.1E-02	7	7
Ra226	4.74E+02	NA	1.0E+02	1.0E+02	1.0E+02	9.1E+03	1.0E+02	0.0E+00	8.1E+01	1.6E+03	7	7
Ra228	1.52E-07	NA	1.0E+02	1.0E+02	1.0E+02	9.1E+03	1.0E+02	0.0E+00	8.1E+01	5.8E+00	7	7
Rb86	0.00E+00	NA	5.5E+01	5.5E+01	5.5E+01	2.7E+02	5.5E+01	0.0E+00	1.6E+01	5.1E-02	6	6
Rb87	1.11E-02	NA	5.5E+01	5.5E+01	5.5E+01	2.7E+02	5.5E+01	0.0E+00	1.6E+01	4.7E+10	6	6
Rh102	2.97E-02	NA	5.2E+01	5.2E+01	5.2E+01	2.7E+02	5.2E+01	0.0E+00	1.4E+01	2.9E+00	6	6
Rh103m	2.83E-55	NA	5.2E+01	5.2E+01	5.2E+01	5.2E+01	5.2E+01	0.0E+00	1.4E+01	1.1E-04	6	6
Rh106	1.14E+01	NA	5.2E+01	5.2E+01	5.2E+01	5.2E+01	5.2E+01	0.0E+00	1.4E+01	9.5E-07	6	6
Rn218	1.26E-113	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-09	1	1
Rn219	2.03E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-07	1	1
Rn220	5.53E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-06	1	1
Rn222	6.21E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-02	1	1
Ru103	2.01E-26	NA	5.5E+01	5.5E+01	5.5E+01	8.0E+02	5.5E+01	0.0E+00	1.9E+01	1.1E-01	7	7
Ru106	1.21E+01	NA	5.5E+01	5.5E+01	5.5E+01	8.0E+02	5.5E+01	0.0E+00	1.9E+01	1.0E+00	7	7
Sb124	2.07E-37	NA	5.0E+01	5.0E+01	5.0E+01	2.5E+02	5.0E+01	0.0E+00	1.5E+01	1.6E-01	6	6
Sb125	9.27E+03	NA	5.0E+01	5.0E+01	5.0E+01	2.5E+02	5.0E+01	0.0E+00	1.5E+01	2.8E+00	6	6
Sb126	2.06E+01	NA	5.0E+01	5.0E+01	5.0E+01	2.5E+02	5.0E+01	0.0E+00	1.5E+01	3.4E-02	6	6

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{Dl})	Organic Carbon		Operations Layer		Clean Alluvium		Interbeds Materials K _d		Vadose Zone			
		Partition Coefficient (K _{oc})	Waste Soils K _d	K _d	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(mL/g)	K _d	(mL/g)	Half-Life	
		(pCi/kg or mg/kg)	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(mL/g)	(yr)		Surrogates	
Sb126m	1.47E+02	NA	5.0E+01	5.0E+01	5.0E+01	2.5E+02	5.0E+01	0.0E+00	1.5E+01	3.6E-05	6		
Sc-46	2.85E-17	NA	3.1E+02	3.1E+02	3.1E+02	3.1E+02	3.1E+02	0.0E+00	8.3E+01	2.3E-01	7		
Se 79	1.66E+02	NA	4.0E+00	4.0E+00	4.0E+00	7.4E+02	4.0E+00	0.0E+00	5.5E+00	6.5E+04	6		
Sm146	4.26E-07	NA	2.4E+02	2.4E+02	2.4E+02	1.3E+03	2.4E+02	0.0E+00	7.1E+01	1.0E+08	7		
Sm147	4.10E-03	NA	2.4E+02	2.4E+02	2.4E+02	1.3E+03	2.4E+02	0.0E+00	7.1E+01	1.1E+11	7		
Sm148	1.01E-09	NA	2.4E+02	2.4E+02	2.4E+02	1.3E+03	2.4E+02	0.0E+00	7.1E+01	7.0E+15	7		
Sm149	5.12E-09	NA	2.4E+02	2.4E+02	2.4E+02	1.3E+03	2.4E+02	0.0E+00	7.1E+01	1.0E+16	7		
Sm151	3.38E+05	NA	2.4E+02	2.4E+02	2.4E+02	1.3E+03	2.4E+02	0.0E+00	7.1E+01	9.0E+01	7		
Sn117m	0.00E+00	NA	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.3E+02	0.0E+00	6.7E+02	3.7E-02	7		
Sn119m	1.48E-04	NA	1.3E+02	1.3E+02	1.3E+02	6.7E+02	1.3E+02	0.0E+00	3.8E+01	8.0E-01	7		
Sn121m	2.69E+01	NA	1.3E+02	1.3E+02	1.3E+02	6.7E+02	1.3E+02	0.0E+00	3.8E+01	5.5E+01	7		
Sn123	8.42E-14	NA	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.3E+02	0.0E+00	3.8E+01	3.5E-01	7		
Sn125	0.00E+00	NA	1.3E+02	1.3E+02	1.3E+02	6.7E+02	1.3E+02	0.0E+00	3.8E+01	2.6E-02	7		
Sn126	1.47E+02	NA	1.3E+02	1.3E+02	1.3E+02	6.7E+02	1.3E+02	0.0E+00	3.8E+01	1.0E+05	7		
Sr89	5.99E-41	NA	1.2E+01	1.2E+01	1.2E+01	2.4E+01	2.4E+01	2.0E+00	1.2E+01	4.5E+00	1.4E-01	6	
Sr90	2.29E+07	NA	1.2E+01	1.2E+01	1.2E+01	2.4E+02	2.4E+02	2.0E+00	1.2E+01	4.5E+00	2.9E+01	6	
Tb160	3.18E-31	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	2.0E-01	7		
Tb161	0.00E+00	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	1.9E-02	7		
Tc 98	1.77E-04	NA	2.0E-01	2.0E-01	2.0E-01	2.0E+02	2.0E+02	2.0E+00	2.0E-01	5.8E-02	4.2E+06	3	
Tc 99	5.76E+03	NA	2.0E-01	2.0E-01	2.0E-01	2.0E+02	2.0E+02	2.0E+00	2.0E-01	5.8E-02	2.1E+05	3	
Te123	4.52E-12	NA	1.3E+02	1.3E+02	1.3E+02	7.2E+02	1.3E+02	0.0E+00	3.7E+01	1.0E+13	7		
Te123m	2.95E-20	NA	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.3E+02	0.0E+00	3.7E+01	3.3E-01	7		
Te125m	2.27E+03	NA	1.3E+02	1.3E+02	1.3E+02	7.2E+02	1.3E+02	0.0E+00	3.7E+01	1.6E-01	7		
Te127	9.36E-17	NA	1.3E+02	1.3E+02	1.3E+02	7.2E+02	1.3E+02	0.0E+00	3.7E+01	1.1E-03	7		
Te127m	9.50E-17	NA	1.3E+02	1.3E+02	1.3E+02	7.2E+02	1.3E+02	0.0E+00	3.7E+01	3.0E-01	7		
Te129	6.75E-68	NA	1.3E+02	1.3E+02	1.3E+02	7.2E+02	1.3E+02	0.0E+00	3.7E+01	1.3E-04	7		
Te129m	1.07E-67	NA	1.3E+02	1.3E+02	1.3E+02	7.2E+02	1.3E+02	0.0E+00	3.7E+01	9.2E-02	7		
Th226	2.18E-114	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	5.9E-05	7		
Th227	1.82E-02	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	5.1E-02	7		
Th228	3.29E+01	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	1.9E+00	7		
Th229	5.12E-05	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	3.6E+01	7.3E+03	7	
Th230	1.73E+02	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	3.6E+01	6.6E-02	7	
Th231	1.61E+02	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	3.6E+01	9.1E-06	7	
Th232	1.56E+02	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	1.4E+10	1.4E+10	7	
Th234	1.71E+00	NA	1.0E+02	1.0E+02	1.0E+02	1.7E+03	1.0E+02	1.0E+02	1.0E+02	0.0E+00	3.6E+01	4.2E-06	7
T1207	1.83E-02	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	0.0E+00	2.7E+01	2.7E+01	7
T1208	1.98E-01	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	0.0E+00	2.7E+01	5.8E-06	7
T1209	1.05E-06	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	0.0E+00	2.7E+01	4.2E-06	7

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{pi})	Organic Carbon			Operations Layer			Clean Alluvium			Interbeds Materials K _d			Vadose Zone		
		Partition Coefficient (K _{oc})	Waste Soils K _d	(mL/g)	K _d	(mL/g)	K _d	(mL/g)	Clay Materials K _d	(mL/g)	K _d	(mL/g)	(mL/g)	Weighted Average	K _d	Half-Life (yr)
Tm170	6.38E-23	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	3.5E-01	7				
Tm171	1.59E-09	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	1.9E+00	7				
U230	0.00E+00	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	5.7E-02	4				
U232	5.35E-01	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	7.2E+01	4				
U233	2.56E-02	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	1.6E+05	4				
U234	6.03E+03	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	2.5E+05	4				
U235	1.10E+02	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	7.0E+08	4				
U236	2.02E+02	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	2.3E+07	4				
U237	0.00E+00	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	1.8E-02	4				
U238	1.95E+03	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	4.5E+09	4				
U240	2.54E-08	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	2.0E+00	1.6E-03	4				
Xe127	1.58E-69	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-01	1				
Xe129m	0.00E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-02	1				
Xe131m	2.69E-109	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.3E-02	1				
Xe133	0.00E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02	1				
Y90	2.29E+07	NA	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	0.0E+00	5.1E+01	7.3E-03	7				
Y91	4.14E-34	NA	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	0.0E+00	5.1E+01	1.6E-01	7				
Zn65	2.70E-06	NA	1.6E+01	1.6E+01	1.6E+01	1.6E+01	1.6E+01	1.6E+01	0.0E+00	0.0E+00	1.9E+01	7				
Zr93	8.57E+02	NA	6.0E+02	6.0E+02	6.0E+02	6.0E+02	6.0E+02	6.0E+02	0.0E+00	0.0E+00	1.5E+06	8				
Zr95	2.93E-22	NA	6.0E+02	6.0E+02	6.0E+02	6.0E+02	6.0E+02	6.0E+02	0.0E+00	0.0E+00	1.8E-01	8				
1,1,1-Trichloroethane	1.57E-02	1.4E+02	3.4E-01	3.4E-01	3.4E-01	3.4E-01	3.4E-01	3.4E-01	0.0E+00	4.5E-02	3.0E+00	2				
1,1,2,2-Tetrachloroethane	4.95E-05	7.9E+01	2.0E-01	2.0E-01	2.0E-01	2.0E-01	2.0E-01	2.0E-01	0.0E+00	4.0E-02	0.0E+00	2.6E-02	2			
1,1,2-Trichloroethane	2.42E-04	7.5E+01	1.9E-01	1.9E-01	1.9E-01	1.9E-01	1.9E-01	1.9E-01	0.0E+00	3.8E-02	0.0E+00	2.5E-02	2			
1,1-Dichloroethane	2.34E-03	5.3E+01	1.3E-01	1.3E-01	1.3E-01	1.3E-01	1.3E-01	1.3E-01	0.0E+00	2.7E-02	0.0E+00	1.8E-02	2			
1,1,1,2-Tetrachloroethane	1.14E-02	1.7E+03	4.1E+00	4.1E+00	4.1E+00	4.1E+00	4.1E+00	4.1E+00	0.0E+00	3.3E-02	0.0E+00	2.2E-02	2			
1,2,4-Trichlorobenzene	1.14E-02	3.8E+02	9.5E-01	9.5E-01	9.5E-01	9.5E-01	9.5E-01	9.5E-01	0.0E+00	8.3E-01	0.0E+00	5.5E-01	3			
1,2-Dichlorobenzene	5.38E-06	6.5E+01	1.6E-01	1.6E-01	1.6E-01	1.6E-01	1.6E-01	1.6E-01	0.0E+00	4.1E+00	0.0E+00	2.5E-02	2			
1,2-Dichloroethene	1.48E-03	3.8E+01	3.8E+01	3.8E+01	3.8E+01	3.8E+01	3.8E+01	3.8E+01	0.0E+00	9.5E-02	0.0E+00	4.0E-02	2			
1,2,2-Trichloroethane	1.14E-02	1.14E-02	4.1E+00	4.1E+00	4.1E+00	4.1E+00	4.1E+00	4.1E+00	0.0E+00	4.1E+00	0.0E+00	2.7E-01	2			
1,3-Dichlorobenzene	1.14E-02	3.8E+02	9.5E-01	9.5E-01	9.5E-01	9.5E-01	9.5E-01	9.5E-01	0.0E+00	1.9E-01	0.0E+00	1.3E-01	3			
1,4-Dichlorobenzene	4.50E-01	6.2E+02	1.5E+00	1.5E+00	1.5E+00	1.5E+00	1.5E+00	1.5E+00	0.0E+00	1.9E-02	0.0E+00	1.3E-02	2			
1,4-Dioxane	1.88E-05	1.1E+01	2.8E-02	2.8E-02	2.8E-02	2.8E-02	2.8E-02	2.8E-02	0.0E+00	5.5E-03	0.0E+00	3.7E-03	1			
2,4,5-Trichlorophenol	4.46E-02	1.6E+03	4.0E+00	4.0E+00	4.0E+00	4.0E+00	4.0E+00	4.0E+00	0.0E+00	8.0E-01	0.0E+00	5.3E-01	3			
2,4,6-Trichlorophenol	1.83E-02	3.8E+02	9.5E-01	9.5E-01	9.5E-01	9.5E-01	9.5E-01	9.5E-01	0.0E+00	1.9E-01	0.0E+00	1.3E-01	3			
2,4-Dichlorophenol	2.16E-02	1.5E+02	3.7E-01	3.7E-01	3.7E-01	3.7E-01	3.7E-01	3.7E-01	0.0E+00	7.4E-02	0.0E+00	4.9E-02	1			
2,4-Dimethylphenol	1.83E-02	2.1E+02	5.2E-01	5.2E-01	5.2E-01	5.2E-01	5.2E-01	5.2E-01	0.0E+00	1.0E-01	0.0E+00	7.0E-02	3			
2,4-Dinitrophenol	5.09E-02	1.0E-02	2.5E-05	2.5E-05	2.5E-05	2.5E-05	2.5E-05	2.5E-05	0.0E+00	5.0E-06	0.0E+00	3.3E-06	1			
2,4-Dinitrotoluene	1.14E-02	9.6E+01	2.4E-01	2.4E-01	2.4E-01	2.4E-01	2.4E-01	2.4E-01	0.0E+00	4.8E-02	0.0E+00	3.2E-02	2			
												5.0E-01				

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{DI})	Organic Carbon		Operations Layer		Clean Alluvium		Interbeds Materials K _d	Vadose Zone Basalt K _d	Weighted Average K _d	Half-Life (yr)	Vadose Zone Surrogates
		Waste Soils K _d	Partition Coefficient (K _{oc})	K _d	(mL/g)	K _d	(mL/g)					
2,6-Dinitrotoluene	2.07E-02	6.9E+01	1.7E-01	1.7E-01	0.0E+00	3.5E-02	0.0E+00	2.3E-02	5.0E-01	2.3E-02	5.0E-01	2
2-Butanone	2.47E-02	4.5E+00	1.1E-02	1.1E-02	0.0E+00	2.3E-03	0.0E+00	1.5E-03	NA	1.5E-03	NA	1
2-Chloronaphthalene	1.14E-02	1.6E+03	3.9E+00	3.9E+00	0.0E+00	7.8E-01	0.0E+00	5.2E-01	1.9E-01	5.2E-01	1.9E-01	3
2-Chlorophenol	1.83E-02	4.0E+02	1.0E+00	1.0E+00	0.0E+00	2.0E-01	0.0E+00	1.3E-01	6.8E-03	1.3E-01	6.8E-03	3
2-Hexanone	2.70E-03	1.5E+01	3.8E-02	3.8E-02	0.0E+00	7.6E-03	0.0E+00	5.0E-03	NA	5.0E-03	NA	1
2-Methylnaphthalene	5.12E-01	8.5E+03	2.1E+01	2.1E+01	0.0E+00	4.3E+00	0.0E+00	2.8E+00	NA	2.8E+00	NA	5
2-Methylphenol	2.06E-02	9.1E+01	2.3E-01	2.3E-01	0.0E+00	4.6E-02	0.0E+00	3.0E-02	3.8E-02	3.0E-02	3.8E-02	2
2-Nitroaniline	2.72E-02	1.7E+01	4.2E-02	4.2E-02	0.0E+00	8.5E-03	0.0E+00	5.7E-03	NA	5.7E-03	NA	1
2-Nitrophenol	1.83E-02	3.9E+01	9.7E-02	9.7E-02	0.0E+00	1.9E-02	0.0E+00	1.3E-02	5.8E-02	1.3E-02	5.8E-02	2
3,3'-Dichlorobenzidine	1.14E-02	7.2E+02	1.8E+00	1.8E+00	0.0E+00	3.6E-01	0.0E+00	2.4E-01	5.1E-01	2.4E-01	5.1E-01	3
3-Methyl Butanal	2.23E-04	NA	NA	NA	0.0E+00	NA	0.0E+00	NA	NA	NA	NA	1
3-Nitroaniline	2.72E-02	1.7E+01	4.2E-02	4.2E-02	0.0E+00	8.5E-03	0.0E+00	5.7E-03	NA	5.7E-03	NA	1
4,6-Dinitro-2-methylphenol	4.46E-02	6.3E+02	1.6E+00	1.6E+00	0.0E+00	3.2E-01	0.0E+00	2.1E-01	1.1E-01	2.1E-01	1.1E-01	3
4-Bromophenyl-phenylether	1.14E-02	1.7E+04	4.3E+01	4.3E+01	0.0E+00	4.3E+01	0.0E+00	5.7E+00	NA	5.7E+00	NA	6
4-Chloro-3-methylphenol	1.83E-02	5.0E+01	1.3E-01	1.3E-01	0.0E+00	1.7E-02	0.0E+00	1.7E-02	NA	1.7E-02	NA	2
4-Chlorophenyl-phenylether	4.08E-02	6.6E+01	1.7E-01	1.7E-01	0.0E+00	3.3E-02	0.0E+00	2.2E-02	NA	2.2E-02	NA	2
4-Chloroaniline	1.14E-02	3.1E+03	7.8E+00	7.8E+00	0.0E+00	1.6E+00	0.0E+00	1.0E+00	NA	1.0E+00	NA	3
4-Methyl-2-Pentanone	2.96E-02	1.3E+02	3.4E-01	3.4E-01	0.0E+00	6.7E-02	0.0E+00	4.5E-02	3.8E-02	4.5E-02	3.8E-02	2
4-Methylphenol	3.86E-02	8.1E+01	2.0E-01	2.0E-01	0.0E+00	4.0E-02	0.0E+00	2.7E-02	3.8E-02	2.7E-02	3.8E-02	2
4-Nitroaniline	2.72E-02	1.7E+01	4.2E-02	4.2E-02	0.0E+00	8.5E-03	0.0E+00	5.7E-03	NA	5.7E-03	NA	1
4-Nitrophenol	5.16E-02	3.9E+01	9.7E-02	9.7E-02	0.0E+00	1.9E-02	0.0E+00	1.3E-02	1.1E-02	1.3E-02	1.1E-02	1
Acenaphthene	2.02E-01	7.1E+03	1.8E+01	1.8E+01	0.0E+00	3.5E+00	0.0E+00	2.4E+00	3.1E-01	2.4E+00	3.1E-01	4
Acenaphthylene	2.07E-02	2.0E+03	5.0E+00	5.0E+00	0.0E+00	1.0E+00	0.0E+00	6.7E-01	2.8E-01	6.7E-01	2.8E-01	3
Acetone	6.20E-01	5.8E-01	1.4E-03	1.4E-03	0.0E+00	2.9E-04	0.0E+00	1.9E-04	1.1E-02	1.9E-04	1.1E-02	1
Acetonitrile	1.88E-05	1.6E+01	3.9E-02	3.9E-02	0.0E+00	7.8E-03	0.0E+00	5.2E-03	4.8E-02	5.2E-03	4.8E-02	1
Acrolein	9.06E-06	2.1E+01	5.3E-02	5.3E-02	0.0E+00	1.1E-02	0.0E+00	7.1E-03	4.2E-02	7.1E-03	4.2E-02	2
Acrylonitrile	9.06E-06	8.5E-01	2.1E-03	2.1E-03	0.0E+00	4.3E-04	0.0E+00	2.8E-04	6.6E-02	4.3E-04	6.6E-02	1
Anthracene	3.20E-01	3.0E+04	7.4E+01	7.4E+01	0.0E+00	1.5E+01	0.0E+00	9.8E+00	1.4E+00	9.8E+00	1.4E+00	6
Aramite	1.15E-04	1.6E+04	3.9E+01	3.9E+01	0.0E+00	7.8E+00	0.0E+00	5.2E+00	NA	5.2E+00	NA	6
Aroclor-1016	7.69E-03	3.3E+04	8.3E+01	8.3E+01	0.0E+00	1.7E+01	0.0E+00	1.1E+01	7.0E+00	1.1E+01	7.0E+00	6
Aroclor-1254	1.28E-01	2.0E+05	5.0E+02	5.0E+02	0.0E+00	1.0E+02	0.0E+00	1.0E+02	6.7E+01	1.0E+02	6.7E+01	7
Aroclor-1260	7.21E-01	2.9E+05	7.3E+02	7.3E+02	0.0E+00	1.5E+02	0.0E+00	1.5E+02	9.7E+01	1.5E+02	9.7E+01	8
Aroclor-1268	6.22E-02	3.3E+04	8.3E+01	8.3E+01	0.0E+00	1.7E+01	0.0E+00	1.7E+01	1.1E+01	1.7E+01	1.1E+01	6
Benzene	6.03E-01	6.2E+01	1.6E-01	1.6E-01	0.0E+00	1.6E-01	0.0E+00	1.6E-01	3.1E-02	1.6E-01	3.1E-02	2
Benzidine	2.91E-04	1.5E+02	3.9E-01	3.9E-01	0.0E+00	7.7E-02	0.0E+00	7.7E-02	5.2E-02	7.7E-02	5.2E-02	2
Benzo(a)anthracene	2.53E-01	4.0E+05	1.0E+03	1.0E+03	0.0E+00	2.0E+02	0.0E+00	2.0E+02	1.3E+02	2.0E+02	1.3E+02	8
Benzo(a)pyrene	1.05E-01	1.0E+06	2.6E+03	2.6E+03	0.0E+00	5.1E+02	0.0E+00	5.1E+02	4.1E+02	5.1E+02	4.1E+02	8
Benzo(b)fluoranthene	1.79E-01	1.2E+06	3.1E+03	3.1E+03	0.0E+00	6.2E+02	0.0E+00	6.2E+02	4.1E+02	6.2E+02	4.1E+02	8

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C_{Dl}) (pCi/kg or mg/kg)	Organic Carbon Partition Coefficient (K_{oc})			Waste Soils K_d (mL/g)	Operations Layer K_d (mL/g)	Clean Alluvium K_d (mL/g)	Clay Materials K_d (mL/g)	Materials K_d (mL/g)	Interbeds Basalt K_d (mL/g)	Vadose Zone Weighted Average K_d (mL/g)	Vadose Zone Half-Life (yr)	Surrogates
		Vadose Zone											
Benzene(gh,i)perylene	1.14E-02	3.9E+06	9.6E+03	9.6E+03	0.0E+00	1.9E+03	0.0E+00	1.3E+03	0.0E+00	3.4E+00	8.4E+00	8	
Benzo(k)fluoranthene	1.86E-02	1.2E+06	3.1E+03	3.1E+03	0.0E+00	6.2E+02	0.0E+00	4.1E+02	0.0E+00	4.1E+02	8.4E+00	8	
Benzoic acid	8.56E-03	6.0E-01	1.5E-03	1.5E-03	0.0E+00	3.0E-04	0.0E+00	2.0E-04	0.0E+00	1.9E-02	5.3E-01	1	
bis(2-Chloroethoxy)methane	1.14E-02	5.5E+00	1.4E-02	1.4E-02	0.0E+00	2.7E-03	0.0E+00	1.8E-03	0.0E+00	NA	1	1	
bis(2-Chloroethyl)ether	1.14E-02	7.6E+01	1.9E-01	1.9E-01	0.0E+00	3.8E-02	0.0E+00	2.5E-02	0.0E+00	5.8E-01	3.3E-01	2	
bis(2-Chloroisopropyl)ether	1.14E-02	6.1E+01	1.5E-01	1.5E-01	0.0E+00	3.1E-02	0.0E+00	2.0E-02	0.0E+00	3.4E-01	2.9E-01	2	
bis(2-Ethylhexyl)phthalate	1.47E-01	1.5E+07	3.8E+04	3.8E+04	0.0E+00	5.0E+03	0.0E+00	5.5E-01	0.0E+00	5.0E+03	1.2E+03	8	
Butane,1,3,4-Tetrachloro-Butylbenzylphthalate	7.89E-03	7.9E+01	2.0E-01	2.0E-01	0.0E+00	4.0E-02	0.0E+00	2.6E-02	0.0E+00	1.5E-01	2.5E-01	2	
Carbazole	3.23E-02	3.4E+03	8.5E+00	8.5E+00	0.0E+00	1.7E+00	0.0E+00	1.1E+00	0.0E+00	NA	3	7	
Carbon Disulfide	4.55E-02	4.6E+01	1.1E-01	1.1E-01	0.0E+00	2.3E-02	0.0E+00	1.5E-02	0.0E+00	4.1E-03	3.5E-01	3	
Chlorobenzene	6.57E-03	2.2E+02	5.6E-01	5.6E-01	0.0E+00	5.6E-01	0.0E+00	1.1E-01	0.0E+00	7.5E-02	2.7E-02	1	
Chloroethane	3.02E-06	1.5E+01	3.7E-02	3.7E-02	0.0E+00	7.4E-03	0.0E+00	4.9E-03	0.0E+00	NA	2	2	
Chloromethane	3.53E-04	3.5E+01	8.8E-02	8.8E-02	0.0E+00	1.8E-02	0.0E+00	1.2E-02	0.0E+00	NA	3	3	
Chrysene	2.65E-01	4.0E+05	1.0E+03	1.0E+03	0.0E+00	2.0E+02	0.0E+00	1.3E+02	0.0E+00	3.8E+00	NA	8	
Decane, 3,4-Dimethyl	1.61E-04	NA	NA	NA	0.0E+00	NA	0.0E+00	NA	0.0E+00	NA	NA	1	
Diacetone alcohol	4.32E+00	1.3E+02	3.4E-01	3.4E-01	0.0E+00	6.7E-02	0.0E+00	4.5E-02	0.0E+00	3.8E-02	3.6E+00	2	
Dibenz(a,h)anthracene	1.14E-02	3.8E+06	9.5E+03	9.5E+03	0.0E+00	9.5E+03	0.0E+00	1.3E+03	0.0E+00	1.3E+03	3.6E+00	8	
Dibenzofuran	3.24E-01	7.8E+03	1.9E+01	1.9E+01	0.0E+00	3.9E+00	0.0E+00	2.6E+00	0.0E+00	4.8E-02	2.6E+00	5	
Diethylphthalate	1.14E-02	2.9E+02	7.2E-01	7.2E-01	0.0E+00	1.4E-01	0.0E+00	9.6E-02	0.0E+00	1.6E-01	1.6E-01	3	
Dimethyl Disulfide	2.96E-03	NA	NA	NA	0.0E+00	NA	0.0E+00	NA	0.0E+00	NA	NA	1	
Dimethylphthalate	1.14E-02	6.9E+01	1.7E-01	1.7E-01	0.0E+00	3.4E-02	0.0E+00	2.3E-02	0.0E+00	2.2E-02	2.2E-02	2	
Di-n-butylphthalate	2.39E-02	3.4E+04	8.5E+01	8.5E+01	0.0E+00	1.7E+01	0.0E+00	1.1E+01	0.0E+00	5.0E-01	5.0E-01	6	
Di-n-octylphthalate	2.62E-02	8.3E+07	2.1E+05	2.1E+05	0.0E+00	4.2E+04	0.0E+00	2.8E+04	0.0E+00	5.2E-01	7.2E-02	8	
Eicosane	2.83E-03	NA	NA	NA	0.0E+00	NA	0.0E+00	NA	0.0E+00	NA	NA	1	
Ethyl cyanide	1.88E-05	NA	NA	NA	0.0E+00	NA	0.0E+00	NA	0.0E+00	NA	NA	1	
Ethylbenzene	7.81E-02	2.0E+02	5.1E-01	5.1E-01	0.0E+00	1.0E-01	0.0E+00	1.0E-01	0.0E+00	6.8E-02	2.1E-01	3	
Famphur	5.81E-05	4.2E+02	1.0E+00	1.0E+00	0.0E+00	2.7E+02	0.0E+00	5.4E+01	0.0E+00	3.6E+01	3.6E+01	7	
Fluoranthene	7.62E-01	1.1E+05	2.7E+02	2.7E+02	0.0E+00	3.5E+01	0.0E+00	6.9E+00	0.0E+00	4.6E+00	2.5E-01	6	
Fluorene	1.84E-01	1.4E+04	3.5E+01	3.5E+01	0.0E+00	NA	0.0E+00	NA	0.0E+00	NA	NA	1	
Heptadecane, 2,6,10,15-Tetra	3.44E-03	NA	NA	NA	0.0E+00	NA	0.0E+00	NA	0.0E+00	NA	NA	1	
Hexachlorobenzene	1.14E-02	5.5E+04	1.4E+02	1.4E+02	0.0E+00	2.8E+01	0.0E+00	1.8E+01	0.0E+00	8.4E+00	5.3E-01	6	
Hexachlorobutadiene	2.07E-02	5.4E+04	1.3E+02	1.3E+02	0.0E+00	2.7E+01	0.0E+00	1.8E+01	0.0E+00	6.7E+01	3.3E-01	7	
Hexachlorocyclopentadiene	1.14E-02	2.0E+05	5.0E+02	5.0E+02	0.0E+00	5.0E+02	0.0E+00	4.5E+00	0.0E+00	8.9E-01	5.9E-01	3	
Hexachloroethane	1.14E-02	1.8E+03	4.5E+00	4.5E+00	0.0E+00	4.5E+00	0.0E+00	4.5E+00	0.0E+00	1.2E+03	1.2E+03	8	
Indeno(1,2,3-cd)pyrene	1.14E-02	3.5E+06	8.7E+03	8.7E+03	0.0E+00	8.7E+03	0.0E+00	1.7E+03	0.0E+00	1.7E+03	1.7E+03	8	
Isobutyl alcohol	1.88E-05	4.7E+00	1.2E-02	1.2E-02	0.0E+00	1.2E-02	0.0E+00	1.6E-03	0.0E+00	1.2E-02	1.2E-02	1	
Isophorone	1.14E-02	4.7E+01	1.2E-01	1.2E-01	0.0E+00	2.3E-02	0.0E+00	1.6E-02	0.0E+00	5.8E-02	5.8E-02	2	

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{DI})	Organic Carbon			Operations Layer			Clean Alluvium			Interbeds Materials K _d			Vadose Zone		
		Partition Coefficient (K _{OC})	Waste Soils K _d	(mL/g)	K _d	(mL/g)	K _d	Clay Materials K _d	(mL/g)	K _d	(mL/g)	Weighted Average	Half-Life	Surrogates		
Isopropyl Alcohol/2-propanol	2.12E-03	8.9E-01	2.2E-03	2.2E-03	4.5E-04	0.0E+00	3.0E-04	1.1E-02	1.1E-02	1.4E+00	1.4E+00	1.4E+00	1			
Kepone	9.92E-02	5.5E+04	1.4E+02	1.4E+02	2.8E+01	0.0E+00	2.8E+01	1.4E+01	1.4E+01	0.0E+00	0.0E+00	4.5E-02	6			
Mesityl oxide	8.48E-02	1.3E+02	3.4E-01	3.4E-01	6.7E-02	0.0E+00	6.7E-02	3.8E-02	3.8E-02	0.0E+00	0.0E+00	7.3E-04	2			
Methyl Acetate	4.84E-04	2.2E+00	5.5E-03	5.5E-03	1.1E-03	0.0E+00	1.1E-03	NA	NA	0.0E+00	0.0E+00	3.3E-03	1			
Methylene Chloride	8.36E-02	1.0E+01	2.5E-02	2.5E-02	5.0E-03	0.0E+00	5.0E-03	3.0E-02	3.0E-02	0.0E+00	0.0E+00	6.7E-01	1			
Naphthalene	4.25E-01	2.0E+03	5.0E+00	5.0E+00	9.8E-02	0.0E+00	9.8E-02	3	3	0.0E+00	0.0E+00	1.6E-01	2			
Nitrobenzene	1.14E-02	6.5E+01	1.6E-01	1.6E-01	5.4E-01	0.0E+00	5.4E-01	2.2E-02	2.2E-02	0.0E+00	0.0E+00	3.2E-02	2			
N-Nitroso-di-n-propylamine	1.14E-02	2.4E+01	6.0E-02	6.0E-02	1.2E-02	0.0E+00	1.2E-02	5.6E-01	5.6E-01	0.0E+00	0.0E+00	8.0E-03	2			
N-Nitrosodiphenylamine	1.14E-02	1.3E+03	3.2E+00	3.2E+00	3.2E+00	0.0E+00	3.2E+00	6.5E-01	6.5E-01	0.0E+00	0.0E+00	4.3E-01	3			
Octane,2,3,7-Trimethyl-o-Toluenesulfonamide	1.61E-04	NA	NA	NA	NA	0.0E+00	NA	NA	NA	NA	NA	NA	1			
Pentachlorophenol	5.06E-03	5.9E+02	1.5E+00	1.5E+00	1.5E+00	0.0E+00	1.5E+00	2.0E-01	2.0E-01	0.0E+00	0.0E+00	3.0E-01	3			
Phenanthrene	1.17E+00	4.8E+03	1.2E+01	1.2E+01	1.2E+01	0.0E+00	1.2E+01	5.9E-01	5.9E-01	0.0E+00	0.0E+00	2.4E+00	3			
Phenol	7.98E-02	2.9E+01	7.2E-02	7.2E-02	7.2E-02	0.0E+00	7.2E-02	1.0E-02	1.0E-02	0.0E+00	0.0E+00	9.6E-03	2			
Phenol,2,6-Bis(1,1-Dimethyl)-p-Toluenesulfonamide	4.05E-03	2.1E+02	5.2E-01	5.2E-01	5.2E-01	0.0E+00	5.2E-01	1.0E-01	1.0E-01	0.0E+00	0.0E+00	7.0E-02	3			
Pyrene	2.53E-01	1.1E+05	2.6E+02	2.6E+02	2.6E+02	0.0E+00	2.6E+02	5.3E+01	5.3E+01	0.0E+00	0.0E+00	3.5E+01	7			
RDX	0.00E+00	7.2E+00	1.8E-02	1.8E-02	1.8E-02	0.0E+00	1.8E-02	3.6E-03	3.6E-03	0.0E+00	0.0E+00	4.6E-03	1			
Styrene	1.03E-06	9.1E+02	2.3E+00	2.3E+00	2.3E+00	0.0E+00	2.3E+00	3.1E-01	3.1E-01	0.0E+00	0.0E+00	8.8E-02	3			
Tetrachloroethene	9.64E-03	2.7E+02	6.6E-01	6.6E-01	6.6E-01	0.0E+00	6.6E-01	7.6E-01	7.6E-01	0.0E+00	0.0E+00	1.3E-01	3			
Toluene	9.82E-01	1.4E+02	3.5E-01	3.5E-01	3.5E-01	0.0E+00	3.5E-01	7.0E-02	7.0E-02	0.0E+00	0.0E+00	4.7E-02	2			
Tributylphosphate	3.64E-01	NA	NA	NA	NA	0.0E+00	NA	NA	NA	0.0E+00	0.0E+00	1.2E+00	1			
Trichloroethene	7.20E-02	9.4E+01	2.4E-01	2.4E-01	2.4E-01	0.0E+00	2.4E-01	4.7E-02	4.7E-02	0.0E+00	0.0E+00	7.2E-01	2			
Trinitrotoluene	0.00E+00	1.0E+00	2.5E-03	2.5E-03	2.5E-03	0.0E+00	2.5E-03	5.0E-04	5.0E-04	0.0E+00	0.0E+00	2.8E-01	1			
Undecane,4,6-Dimethyl-Xylene (ortho)	1.61E-04	NA	NA	NA	NA	0.0E+00	NA	NA	NA	0.0E+00	0.0E+00	NA	1			
Xylene (total)	3.88E-03	2.0E+02	4.9E-01	4.9E-01	4.9E-01	0.0E+00	4.9E-01	9.8E-02	9.8E-02	0.0E+00	0.0E+00	6.5E-02	3			
Aluminum	3.45E+00	2.0E+02	4.9E-01	4.9E-01	4.9E-01	0.0E+00	4.9E-01	9.8E-02	9.8E-02	0.0E+00	0.0E+00	6.5E-02	3			
Antimony	7.08E+03	NA	5.0E+01	5.0E+01	5.0E+01	0.0E+00	5.0E+01	5.0E+02	2.5E+02	0.0E+00	0.0E+00	6.7E+01	7			
Arsenic	5.83E+00	NA	3.0E+00	3.0E+00	3.0E+00	0.0E+00	3.0E+00	3.0E+00	3.0E+00	0.0E+00	0.0E+00	8.3E+01	6			
Barium	5.65E+00	NA	5.0E+01	5.0E+01	5.0E+01	0.0E+00	5.0E+01	5.0E+01	5.0E+01	0.0E+00	0.0E+00	1.3E+01	6			
Beryllium	1.79E+02	NA	2.5E+02	2.5E+02	2.5E+02	0.0E+00	2.5E+02	2.5E+02	2.5E+02	0.0E+00	0.0E+00	7.3E+01	7			
Boron	1.85E+02	NA	5.0E+00	5.0E+00	5.0E+00	0.0E+00	5.0E+00	5.0E+00	5.0E+00	0.0E+00	0.0E+00	1.3E+00	3			
Cadmium	3.59E+00	NA	6.0E+00	6.0E+00	6.0E+00	0.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	0.0E+00	4.9E+00	6			
Calcium	2.04E+04	NA	5.0E+00	5.0E+00	5.0E+00	0.0E+00	5.0E+00	5.0E+00	5.0E+00	0.0E+00	0.0E+00	1.6E+00	3			
Chloride	1.87E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1			
Chromium	4.12E+01	NA	3.0E+01	3.0E+01	3.0E+01	0.0E+00	3.0E+01	3.0E+01	3.0E+01	0.0E+00	0.0E+00	1.7E+01	6			
Cobalt	6.04E+00	NA	1.0E+01	1.0E+01	1.0E+01	0.0E+00	1.0E+01	5.5E+02	5.5E+02	0.0E+00	0.0E+00	5.9E+00	6			

Table B-2. Summary of Input Parameters for Concentration Calculations

Constituent	Design Inventory (C _{Dl})	(pCi/kg or mg/kg)	(mL/g)	Organic Carbon Partition Coefficient (K _{oc})	Waste Soils K _d (mL/g)	Operations Layer K _d (mL/g)	Clean Alluvium K _d (mL/g)	Clay Materials K _d (mL/g)	Interbeds Materials K _d (mL/g)	Vadose Zone	Weighted Average K _d	(mL/g)	Half-Life (yr)	
										Vadose Zone Basalt K _d				
Copper	2.99E+01	NA	2.0E+01	2.0E+01	2.0E+01	2.2E-02	2.2E-02	2.0E+01	2.0E+01	0.0E+00	5.4E+00	NA	6	
Cyanide	3.37E-01	8.9E+00	2.2E-02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	4.5E-03	0.0E+00	3.0E-03	NA	1	
Dysprosium	5.93E+01	NA	2.4E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.4E+01	0.0E+00	6.4E+01	NA	7	
Fluoride	3.87E+00	NA	0.0E+00	2.2E+02	2.2E+02	2.2E+02	2.2E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1	
Iron	1.02E+04	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.7E+02	0.0E+00	5.9E+01	NA	7	
Lead	5.76E+01	NA	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	7.1E+02	0.0E+00	3.0E+01	NA	7	
Magnesium	4.47E+03	NA	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	0.0E+00	1.6E+00	NA	3	
Manganese	2.07E+02	NA	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	5.0E+01	1.8E+02	0.0E+00	1.4E+01	NA	6	
Mercury	9.45E+00	5.2E+01	1.3E-01	1.3E-01	1.3E-01	1.3E-01	1.3E-01	1.3E-01	1.3E-01	0.0E+00	2.6E-02	NA	5	
Molybdenum	1.02E+01	NA	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	1.0E+01	9.0E+01	1.0E+01	0.0E+00	3.2E+00	NA	5
Nickel	1.97E+01	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	6.5E+02	0.0E+00	3.0E+01	NA	7	
Nitrate	3.93E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1	
Nitrate/Nitrite-N	2.22E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1	
Nitrite	8.49E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1	
Phosphorus	9.74E+01	NA	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	5.0E+00	3.5E+01	0.0E+00	0.0E+00	NA	3	
Potassium	1.13E+03	NA	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.5E+01	7.5E+01	1.5E+01	0.0E+00	4.4E+00	NA	5
Selenium	8.46E-01	NA	4.0E+00	4.0E+00	4.0E+00	4.0E+00	4.0E+00	4.0E+00	7.4E+02	4.0E+00	0.0E+00	5.5E+00	NA	6
Silver	9.84E+00	NA	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	9.0E+01	1.8E+02	9.0E+01	0.0E+00	2.5E+01	NA	7
Sodium	2.11E+02	NA	7.6E+01	7.6E+01	7.6E+01	7.6E+01	7.6E+01	7.6E+01	7.6E+01	0.0E+00	2.0E+01	0.0E+00	7	
Strontium	1.82E+01	NA	1.2E+01	1.2E+01	1.2E+01	1.2E+01	1.2E+01	1.2E+01	2.4E+02	1.2E+01	0.0E+00	4.5E+00	NA	6
Sulfate	2.05E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E+02	1.0E+02	0.0E+00	0.0E+00	NA	1
Sulfide	7.59E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1
Terbium	5.73E+02	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	0.0E+00	7	
Thallium	3.70E-01	NA	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	0.0E+00	2.7E+01	NA	7
Vanadium	2.12E+01	NA	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	6.0E+00	0.0E+00	1.6E+00	NA	3
Ytterbium	1.95E+02	NA	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	6.4E+01	0.0E+00	7	
Zinc	2.08E+02	NA	1.6E+01	1.6E+01	1.6E+01	1.6E+01	1.6E+01	1.6E+01	3.3E+03	6.0E+02	0.0E+00	1.9E+01	NA	7
Zirconium	6.91E+01	NA	6.0E+02	6.0E+02	6.0E+02	6.0E+02	6.0E+02	6.0E+02	3.3E+03	6.0E+02	0.0E+00	1.8E+02	NA	8

NA= Not available

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
Ac225	0.00E+00
Ac227	0.00E+00
Ac228	0.00E+00
Ag106	0.00E+00
Ag108	0.00E+00
Ag108m	1.08E-147
Ag109m	0.00E+00
Ag110	0.00E+00
Ag110m	0.00E+00
Ag111	0.00E+00
Am241	0.00E+00
Am242	0.00E+00
Am242m	0.00E+00
Am243	8.96E-43
Am245	0.00E+00
Am246	0.00E+00
At217	0.00E+00
Ba136m	0.00E+00
Ba137m	0.00E+00
Ba140	0.00E+00
Be 10	3.53E-11
Bi210	0.00E+00
Bi211	0.00E+00
Bi212	0.00E+00
Bi213	0.00E+00
Bi214	0.00E+00
Bk249	0.00E+00
Bk250	0.00E+00
C 14	4.63E-08
Cd109	0.00E+00
Cd113m	0.00E+00
Cd115m	0.00E+00
Ce141	0.00E+00
Ce142	0.00E+00
Ce144	0.00E+00
Cf249	0.00E+00
Cf250	0.00E+00
Cf251	4.10E-214
Cf252	0.00E+00
Cm241	0.00E+00
Cm242	0.00E+00
Cm243	0.00E+00
Cm244	0.00E+00
Cm245	1.57E-43
Cm246	3.25E-60
Cm247	3.17E-29

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
Cm248	1.31E-30
Cm250	2.33E-58
Co-57	0.00E+00
Co-58	0.00E+00
Co-60	0.00E+00
Cr-51	0.00E+00
Cs132	0.00E+00
Cs134	0.00E+00
Cs135	1.37E-15
Cs136	0.00E+00
Cs137	0.00E+00
Er169	0.00E+00
Eu150	0.00E+00
Eu152	0.00E+00
Eu154	0.00E+00
Eu155	0.00E+00
Eu156	0.00E+00
Fe-59	0.00E+00
Fr221	0.00E+00
Fr223	0.00E+00
Gd152	1.33E-18
Gd153	0.00E+00
H-3	2.15E-08
Hf-181	0.00E+00
Ho166m	0.00E+00
I-129	1.28E-01
I-131	0.00E+00
In-114	0.00E+00
In-114m	0.00E+00
In-115	3.00E-25
In-115m	0.00E+00
K-40	5.69E-03
Kr-81	5.75E-10
Kr-85	2.27E-07
La-138	0.00E+00
La-140	0.00E+00
Mn-54	0.00E+00
Nb-92	3.04E-23
Nb-93m	0.00E+00
Nb-94	1.10E-16
Nb-95	0.00E+00
Nb-95m	0.00E+00
Nd-144	1.59E-14
Nd-147	0.00E+00
Np-235	0.00E+00
Np-236	4.30E-12
Np-237	1.38E-03

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
Np238	0.00E+00
Np239	0.00E+00
Np240	0.00E+00
Np240m	0.00E+00
Pa231	1.89E-26
Pa233	0.00E+00
Pa234	0.00E+00
Pa234m	0.00E+00
Pb209	0.00E+00
Pb210	0.00E+00
Pb211	0.00E+00
Pb212	0.00E+00
Pb214	0.00E+00
Pd107	4.54E-06
Pm146	0.00E+00
Pm147	0.00E+00
Pm148	0.00E+00
Pm148m	0.00E+00
Po210	0.00E+00
Po211	0.00E+00
Po212	0.00E+00
Po213	0.00E+00
Po214	0.00E+00
Po215	0.00E+00
Po216	0.00E+00
Po218	0.00E+00
Pr143	0.00E+00
Pr144	0.00E+00
Pr144m	0.00E+00
Pu236	0.00E+00
Pu237	0.00E+00
Pu238	1.05E-204
Pu239	2.90E-10
Pu240	2.81E-16
Pu241	0.00E+00
Pu242	1.86E-09
Pu243	0.00E+00
Pu244	1.23E-15
Pu246	0.00E+00
Ra222	0.00E+00
Ra223	0.00E+00
Ra224	0.00E+00
Ra225	0.00E+00
Ra226	1.00E-25
Ra228	0.00E+00
Rb86	0.00E+00
Rb87	9.21E-09

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
Rh102	0.00E+00
Rh103m	0.00E+00
Rh106	0.00E+00
Rn218	0.00E+00
Rn219	0.00E+00
Rn220	0.00E+00
Rn222	0.00E+00
Ru103	0.00E+00
Ru106	0.00E+00
Sb124	0.00E+00
Sb125	0.00E+00
Sb126	0.00E+00
Sb126m	0.00E+00
Sc-46	0.00E+00
Se 79	1.30E-07
Sm146	2.06E-14
Sm147	2.00E-10
Sm148	4.92E-17
Sm149	2.50E-16
Sm151	1.24E-199
Sn117m	0.00E+00
Sn119m	0.00E+00
Sn121m	0.00E+00
Sn123	0.00E+00
Sn125	0.00E+00
Sn126	1.79E-08
Sr89	0.00E+00
Sr90	0.00E+00
Tb160	0.00E+00
Tb161	0.00E+00
Tc 98	1.11E-08
Tc 99	3.04E-01
Te123	2.20E-19
Te123m	0.00E+00
Te125m	0.00E+00
Te127	0.00E+00
Te127m	0.00E+00
Te129	0.00E+00
Te129m	0.00E+00
Th226	0.00E+00
Th227	0.00E+00
Th228	0.00E+00
Th229	3.77E-23
Th230	6.56E-09
Th231	0.00E+00
Th232	7.60E-06
Th234	0.00E+00

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
Tl207	0.00E+00
Tl208	0.00E+00
Tl209	0.00E+00
Tm170	0.00E+00
Tm171	0.00E+00
U230	0.00E+00
U232	3.85E-77
U233	6.62E-09
U234	3.26E-03
U235	3.78E-04
U236	6.76E-04
U237	0.00E+00
U238	6.69E-03
U240	0.00E+00
Xe127	1.75E-161
Xe129m	0.00E+00
Xe131m	0.00E+00
Xe133	0.00E+00
Y90	0.00E+00
Y91	0.00E+00
Zn65	0.00E+00
Zr93	2.82E-14
Zr95	0.00E+00
1,1,1-Trichloroethane	4.3E-27
1,1,2,2-Tetrachloroethane	7.07E-75
1,1,2-Trichloroethane	4.6E-27
1,1-Dichloroethane	1.2E-33
1,1-Dichloroethene	1.57E-50
1,2,4-Trichlorobenzene	4.93E-49
1,2-Dichlorobenzene	0.00E+00
1,2-Dichloroethane	9.24E-35
1,2-Dichloroethene (total)	1.62E-27
1,3-Dichlorobenzene	4.93E-49
1,4-Dichlorobenzene	1.95E-47
1,4-Dioxane	1.7E-33
2,4,5-Trichlorophenol	7.7E-25
2,4,6-Trichlorophenol	2.49E-25
2,4-Dichlorophenol	4.1E-143
2,4-Dimethylphenol	0.00E+00
2,4-Dinitrophenol	3.5E-27
2,4-Dinitrotoluene	6.40E-35
2,6-Dinitrotoluene	1.16E-34
2-Butanone	1.7E-27
2-Chloronaphthalene	1.57E-111
2-Chlorophenol	4.1E-39
2-Hexanone	3.23E-07
2-Methylnaphthalene	3.24E-05

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
2-Methylphenol	7.76E-235
2-Nitroaniline	3.26E-06
2-Nitrophenol	1.18E-162
3,3'-Dichlorobenzidine	2.1E-49
3-Methyl Butanal	2.68E-08
3-Nitroaniline	3.26E-06
4,6-Dinitro-2-methylphenol	1.23E-174
4-Bromophenyl-phenylether	9.40E-09
4-Chloro-3-methylphenol	1.81E-06
4-Chloroaniline	4.04E-06
4-Chlorophenyl-phenylether	7.20E-07
4-Methyl-2-Pentanone	1.12E-234
4-Methylphenol	1.45E-234
4-Nitroaniline	3.26E-06
4-Nitrophenol	0.00E+00
Acenaphthene	0.00E+00
Acenaphthylene	6.95E-81
Acetone	0.0E+00
Acetonitrile	5.0E-35
Acrolein	3.6E-108
Acrylonitrile	1.54E-136
Anthracene	0.00E+00
Aramite	9.46E-11
Aroclor-1016	0.0E+00
Aroclor-1254	0.0E+00
Aroclor-1260	0.0E+00
Aroclor-1268	0.0E+00
Benzene	5.7E-25
Benzidine	0.00E+00
Benzo(a)anthracene	0.00E+00
Benzo(a)pyrene	0.00E+00
Benzo(b)fluoranthene	0.00E+00
Benzo(g,h,i)perylene	0.00E+00
Benzo(k)fluoranthene	0.00E+00
Benzoic acid	0.00E+00
bis(2-Chloroethoxy)methane	1.36E-06
bis(2-Chloroethyl)ether	8.46E-33
bis(2-Chloroisopropyl)ether	1.0E-33
bis(2-Ethylhexyl)phthalate	0.00E+00
Butane,1,1,3,4-Tetrachloro-	1.13E-72
Butylbenzylphthalate	0.00E+00
Carbazole	2.05E-06
Carbon Disulfide	0.00E+00
Chlorobenzene	3.2E-48
Chloroethane	0.0E+00
Chloromethane	3.50E-08
Chrysene	0.00E+00

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
Decane, 3,4-Dimethyl	1.94E-08
Diacetone alcohol	1.63E-232
Dibenz(a,h)anthracene	0.00E+00
Dibenzofuran	0.0E+00
Diethylphthalate	2.75E-127
Dimethyl Disulfide	3.55E-07
Dimethylphthalate	0.00E+00
Di-n-butylphthalate	0.00E+00
Di-n-octylphthalate	0.00E+00
Eicosane	0.00E+00
Ethyl cyanide	2.26E-09
Ethylbenzene	1.5E-72
Famphur	1.24E-76
Fluoranthene	0.00E+00
Fluorene	0.00E+00
Heptadecane, 2,6,10,15-Tetra	4.12E-07
Hexachlorobenzene	0.00E+00
Hexachlorobutadiene	0.0E+00
Hexachlorocyclopentadiene	0.0E+00
Hexachloroethane	2.1E-49
Indeno(1,2,3-cd)pyrene	0.0E+00
Isobutyl alcohol	0.0E+00
Isophorone	4.5E-105
Isopropyl Alcohol/2-propanol	0.0E+00
Kepone	0.0E+00
Mesityl oxide	3.19E-234
Methyl Acetate	5.81E-08
Methylene Chloride	0.0E+00
Naphthalene	1.6E-66
Nitrobenzene	1.06E-33
N-Nitroso-di-n-propylamine	2.70E-33
N-Nitrosodiphenylamine	2.35E-164
Octane,2,3,7-Trimethyl	1.94E-08
o-Toluenesulfonamide	6.07E-07
Pentachlorophenol	4.6E-26
Phenanthrene	3.83E-46
Phenol	0.00E+00
Phenol,2,6-Bis(1,1-Dimethyl)	0.00E+00
p-Toluenesulfonamide	6.07E-07
Pyrene	0.00E+00
RDX	0.00E+00
Styrene	1.01E-79
Tetrachloroethene	1.6E-30
Toluene	8.1E-190
Tributylphosphate	4.36E-05
Trichloroethene	1.8E-20
Trinitrotoluene	0.0E+00

Table B-3. Summary of Maximum Concentrations over Time (C_T)

Constituent	Maximum Concentration pCi/L or mg/L
Undecane,4,6-Dimethyl-	1.94E-08
Xylene (ortho)	2.5E-53
Xylene (total)	2.2E-50
Aluminum	3.45E-04
Antimony	4.82E-06
Arsenic	3.57E-04
Barium	1.48E-04
Beryllium	1.40E-08
Boron	1.17E-02
Cadmium	2.96E-06
Calcium	1.29E+00
Chloride	2.24E-04
Chromium	3.40E-05
Cobalt	4.99E-06
Copper	2.47E-05
Cyanide	4.04E-05
Dysprosium	2.89E-06
Fluoride	4.64E-04
Iron	4.99E-04
Lead	2.81E-06
Magnesium	2.83E-01
Manganese	1.71E-04
Mercury	4.61E-07
Molybdenum	3.02E-05
Nickel	9.58E-07
Nitrate	4.71E-04
Nitrate/Nitrite-N	2.66E-05
Nitrite	1.02E-06
Phosphorus	6.16E-03
Potassium	3.35E-03
Selenium	6.99E-07
Silver	4.80E-07
Sodium	1.03E-05
Strontium	1.50E-05
Sulfate	2.46E-03
Sulfide	9.10E-02
Terbium	2.79E-05
Thallium	1.81E-08
Vanadium	1.34E-03
Ytterbium	4.63E-13
Zinc	1.01E-05
Zirconium	3.58E-15

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration		Risk Factor (mg/L or pCi/L)	Individual MCL	Beta & Photon Emitters MCL C4 Values								MCL				
	(RBC) (mg/L or pCi/L)	(WBC) (mg/L or pCi/L)			Non-Carcinogenic	Carcinogenic	Carcinogenic	Total Body	GI(LL)	GI(S)	Liver	Fat	Thyroid	Pancreas	Bone Marrow	Bone (FRC) (pCi/L)	Kidney (FRC) (pCi/L)
Ac225	2.79E+01	--	2.79E+05	No Limit													Yes
Ac227	2.63E+01	--	2.63E+05	No Limit													Yes
Ac228	2.65E+03	--	2.65E+07	No Limit													
Ag106	8.93E+04	--	8.93E+08	No Limit													
Ag108		--		No Limit													
Ag108m	6.49E+02	--	6.49E+06	No Limit													
Ag109n	--	--	No Limit	No Limit													
Ag110	--	--	No Limit	No Limit													
Ag110m	5.35E+02	--	5.35E+06	No Limit													90
Ag111	6.44E+02	--	6.44E+06	No Limit													100
Am241	5.08E+01	--	5.08E+05	No Limit													Yes
Am242	2.95E+03	--	2.95E+07	No Limit													Yes
Am242m	7.47E+01	--	7.47E+05	No Limit													Yes
Am243	5.13E+01	--	5.13E+05	No Limit													Yes
Am245	2.38E+04	--	2.38E+08	No Limit													
Am246	4.29E+04	--	4.29E+08	No Limit													
Ar217	--	--	No Limit	No Limit													Yes
Ba136m	--	--	No Limit	No Limit													
Ba137m	--	--	No Limit	No Limit													
Ba140	3.54E+02	--	3.54E+06	No Limit													
Be 10	7.51E+02	--	7.51E+06	No Limit													
Bi210	5.92E+02	--	5.92E+06	No Limit													
Bi211	--	--	No Limit	No Limit													
Bi212	7.44E+03	--	7.44E+07	No Limit													Yes
Bi213	1.03E+04	--	1.03E+08	No Limit													Yes
Bi214	2.75E+04	--	2.75E+08	No Limit													Yes
Bk249	4.76E+03	--	4.76E+07	No Limit													Yes
Bk250	9.33E+03	--	9.33E+07	No Limit													Yes
C 14	3.41E+03	--	3.41E+07	No Limit													
Cd109	1.06E+03	--	1.06E+07	No Limit													
Cd113m	1.84E+02	--	1.84E+06	No Limit													
Cd115m	3.11E+02	--	3.11E+06	No Limit													90
Ce141	1.14E+03	--	1.14E+07	No Limit													300
Ce142	--	--	No Limit	No Limit													
Ce144	1.50E+02	--	1.50E+06	No Limit													
Cf249	4.16E+01	--	4.16E+05	No Limit													
Cf250	6.13E+01	--	6.13E+05	No Limit													

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration (RBC) (mg/L or pCi/L)	Risk Factor (mg/L or pCi/L)	Individual MCL			Beta & Photon Emitters MCL C4 Values			MCL				
			Total Body	Non- Carcinogenic	Carcinogenic	GI(LI) (pCi/L)	GI(S) (pCi/L)	Liver (pCi/L)	Fat (pCi/L)	Thyroid (pCi/L)	Pancreas (pCi/L)	Bone (FRC) (pCi/L)	Marrow (FRC) (pCi/L)
Cf251	4.00E+01	--	4.00E+05	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cf252	--	--	No Limit	No Limit	No Limit	1.09E+03	1.09E+07	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm241	1.37E+02	--	1.37E+06	No Limit	No Limit	5.58E+01	5.58E+05	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm242	5.58E+01	--	6.32E+05	No Limit	No Limit	6.32E+01	6.32E+05	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm243	5.08E+01	--	5.08E+05	No Limit	No Limit	5.18E+01	5.18E+05	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm244	5.31E+01	--	5.31E+05	No Limit	No Limit	5.31E+01	5.31E+05	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm245	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm246	5.08E+03	--	5.08E+07	No Limit	No Limit	1.79E+03	1.79E+07	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm247	3.37E+02	--	3.37E+06	No Limit	No Limit	2.85E+04	2.85E+08	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm248	3.62E+03	--	3.62E+07	No Limit	No Limit	1.25E+02	1.25E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cm250	1.11E+03	--	1.11E+07	No Limit	No Limit	6.10E+02	6.10E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Co-57	2.09E+03	--	2.09E+07	No Limit	No Limit	1.74E+02	1.74E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Co-58	2.22E+03	--	2.22E+07	No Limit	No Limit	8.70E+02	8.70E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Co-60	5.13E+02	--	5.13E+06	No Limit	No Limit	2.78E+03	2.78E+07	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cr-51	4.16E+02	--	4.16E+06	No Limit	No Limit	6.70E+02	6.70E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cs132	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cs134	1.10E+03	--	1.10E+07	No Limit	No Limit	1.74E+02	1.74E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cs135	1.74E+02	--	1.74E+06	No Limit	No Limit	2.09E+03	2.09E+07	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cs136	8.70E+02	--	8.70E+06	No Limit	No Limit	2.22E+03	2.22E+07	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Cs137	5.13E+02	--	5.13E+06	No Limit	No Limit	2.78E+03	2.78E+07	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Er169	5.13E+02	--	5.13E+06	No Limit	No Limit	4.16E+02	4.16E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Eu150	8.70E+02	--	8.70E+06	No Limit	No Limit	6.70E+02	6.70E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Eu152	2.09E+03	--	2.09E+07	No Limit	No Limit	7.24E+02	7.24E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Eu154	2.22E+03	--	2.22E+07	No Limit	No Limit	1.78E+02	1.78E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Eu155	5.13E+02	--	5.13E+06	No Limit	No Limit	3.47E+03	3.47E+07	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Eu156	2.78E+03	--	2.78E+07	No Limit	No Limit	1.04E+05	1.04E+09	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Fe-59	4.16E+02	--	4.16E+06	No Limit	No Limit	6.70E+02	6.70E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Fr221	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Fr223	7.24E+02	--	7.24E+06	No Limit	No Limit	1.78E+02	1.78E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Gd152	3.47E+03	--	3.47E+07	No Limit	No Limit	1.04E+05	1.04E+09	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Gd153	1.04E+05	--	1.04E+09	No Limit	No Limit	8.30E+02	8.30E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
H ³	3.57E+01	--	3.57E+05	No Limit	No Limit	5.73E+02	5.73E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Hf-181	1.16E+02	--	1.16E+06	No Limit	No Limit	1.16E+02	1.16E+06	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
Ho166m	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
I129	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
I131	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes
In114	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	Yes

1 3

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration		Risk Factor (mg/L or pCi/L)	Individual MCL	Beta & Photon Emitters MCL C4 Values						MCL			
	(RBC) (mg/L or pCi/L)	Non- Carcinogenic Carcinogenic			Total Body	GI(LLD) (pCi/L)	GI(S) (pCi/L)	Liver (pCi/L)	Fat (pCi/L)	Thyroid (pCi/L)	Pancreas (pCi/L)	Bone Marrow (FRC) (pCi/L)	Kidney (FRC) (pCi/L)	Alpha emitter?
In114m	2.13E+02	--	2.13E+06	No Limit	60									
In115	1.56E+02	--	1.56E+06	No Limit	300									
In115m	1.20E+04	--	1.20E+08	No Limit	1000									
K-40	2.14E+02	--	2.14E+06	No Limit										
Kr81	--	--	No Limit	No Limit										
Kr85	--	--	No Limit	No Limit										
La138	1.50E+03	--	1.50E+07	No Limit										
La140	4.80E+02	--	4.80E+06	No Limit										
Mn-54	2.32E+03	--	2.32E+07	No Limit										
Nb92	--	--	No Limit	No Limit										
Nb93m	6.80E+02	--	6.80E+06	No Limit										
Nb94	--	--	No Limit	No Limit										
Nb95	2.16E+03	--	2.16E+07	No Limit										
Nb95m	1.44E+03	--	1.44E+07	No Limit										
Nd144	--	--	No Limit	No Limit										
Nd147	7.59E+02	--	7.59E+06	No Limit										
Np235	1.53E+04	--	1.53E+08	No Limit										
Np236	5.03E+02	--	5.03E+06	No Limit										
Np237	8.54E+01	--	8.54E+05	No Limit										
Np238	9.78E+02	--	9.78E+06	No Limit										
Np239	1.03E+03	--	1.03E+07	No Limit										
Np240	2.37E+04	--	2.37E+08	No Limit										
Np240m	--	--	No Limit	No Limit										
Pa231	3.05E+01	--	3.05E+05	No Limit										
Pa233	9.51E+02	--	9.51E+06	No Limit										
Pa234	2.06E+03	--	2.06E+07	No Limit										
Pa234m	--	--	No Limit	No Limit										
Pb209	2.19E+04	--	2.19E+08	No Limit										
Pb210	6.00E+00	--	6.00E+04	No Limit										
Pb211	1.29E+04	--	1.29E+08	No Limit										
Pb212	2.12E+02	--	2.12E+06	No Limit										
Pb214	1.54E+04	--	1.54E+08	No Limit										
Pd107	2.11E+04	--	2.11E+08	No Limit										
Pm146	1.26E+03	--	1.26E+07	No Limit										
Pm147	3.12E+03	--	3.12E+07	No Limit										
Pm148	3.07E+02	--	3.07E+06	No Limit										
Pm148m	6.61E+02	--	6.61E+06	No Limit										

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration (RBC) (mg/L or pCi/L)	Risk Factor (mg/L or pCi/L)	MCL											
			Non-Carcinogenic			Carcinogenic			Non-Carcinogenic			Carcinogenic		
	MCL	Total Body	GI(ULI)	GI(S)	Liver	Fat	Thyroid	Pancreas	Bone (FRC)	(pCi/L)	Kidney (pCi/L)	Alpha emitter?		
Po210	1.40E+01	--	1.40E+05	No Limit									Yes	
Po211	--	--	No Limit	No Limit									Yes	
Po212	--	--	No Limit	No Limit									Yes	
Po213	--	--	No Limit	No Limit									Yes	
Po214	--	--	No Limit	No Limit									Yes	
Po215	--	--	No Limit	No Limit									Yes	
Po216	--	--	No Limit	No Limit									Yes	
Po218	--	--	No Limit	No Limit									Yes	
Pr143	6.67E+02	--	6.67E+06	No Limit									100	
Pr144	6.52E+04	--	6.52E+08	No Limit										
Pr144m	--	--	No Limit	No Limit										
Pu236	7.07E+01	--	7.07E+05	No Limit									Yes	
Pu237	9.15E+03	--	9.15E+07	No Limit									Yes	
Pu238	4.03E+01	--	4.03E+05	No Limit									Yes	
Pu239	3.91E+01	--	3.91E+05	No Limit									Yes	
Pu240	3.91E+01	--	3.91E+05	No Limit									Yes	
Pu241	3.00E+03	--	3.00E+07	No Limit									Yes	
Pu242	4.12E+01	--	4.12E+05	No Limit										
Pu243	1.11E+04	--	1.11E+08	No Limit										
Pu244	3.85E+01	--	3.85E+05	No Limit										
Pu246	3.05E+02	--	3.05E+06	No Limit										
Ra222	--	--	No Limit	No Limit									Yes	
Ra223	2.22E+01	--	2.22E+05	No Limit									Yes	
Ra224	3.16E+01	--	3.16E+05	No Limit										
Ra225	4.63E+01	--	4.63E+05	No Limit										
Ra226	1.37E+01	--	1.37E+05	No Limit										
Ra228	5.08E+00	--	<Background	<Background										
Rb86	5.34E+02	--	5.34E+06	No Limit										
Rb87	1.01E+03	--	1.01E+07	No Limit										
Rh102	6.86E+02	--	6.86E+06	No Limit										
Rh103m	5.62E+05	--	5.62E+09	No Limit										
Rh106	--	--	No Limit	No Limit										
Rn218	--	--	No Limit	No Limit									Yes	
Rn219	--	--	No Limit	No Limit									Yes	
Rn220	--	--	No Limit	No Limit									Yes	
Rn222	--	--	No Limit	No Limit										
Ru103	1.37E+03	--	1.37E+07	No Limit										

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration		Risk Factor (mg/L or pCi/L)	Individual MCL	Beta & Photon Emitters MCL C4 Values						MCL				
	(RBC) (mg/L or pCi/L)	(mg/L or pCi/L)			Non-Carcinogenic	Carcinogenic	Non-Carcinogenic	Carcinogenic	Total Body	GI(LL)	GI(UL)	Liver	Bone Marrow		
										(pCi/L)	(pCi/L)	(pCi/L)	(FRC) (pCi/L)	Kidney (FRC) (pCi/L)	Alpha emitter?
Ru106			1.25E+02	-	1.25E+06	No Limit	No Limit	No Limit	30	30	30	30	30		
Sb124			4.09E+02	-	4.09E+06	No Limit	No Limit	No Limit	60	60	60	60	60		
Sb125			1.21E+03	-	1.21E+07	No Limit	No Limit	No Limit	300	300	300	300	300		
Sb126			4.76E+02	-	4.76E+06	No Limit	No Limit	No Limit							
Sb126m			7.93E+04	-	7.93E+08	No Limit	No Limit	No Limit							
Sc-46			8.49E+02	-	8.49E+06	No Limit	No Limit	No Limit							
Se 79			7.24E+02	-	7.24E+06	No Limit	No Limit	No Limit	1000	1000	1000	1000	1000		
Sm146			1.28E+02	-	1.28E+06	No Limit	No Limit	No Limit							
Sm147			1.41E+02	-	1.41E+06	No Limit	No Limit	No Limit							
Sm148			-	-	-	No Limit	No Limit	No Limit							
Sm149			-	-	-	No Limit	No Limit	No Limit							
Sm151			9.51E+03	-	9.51E+07	No Limit	No Limit	No Limit	1000	1000	1000	1000	1000		
Sn117m			1.21E+03	-	1.21E+07	No Limit	No Limit	No Limit							
Sn119m			2.39E+03	-	2.39E+07	No Limit	No Limit	No Limit							
Sn121m			2.26E+03	-	2.26E+07	No Limit	No Limit	No Limit							
Sn123			3.77E+02	-	3.77E+06	No Limit	No Limit	No Limit							
Sn125			2.63E+02	-	2.63E+06	No Limit	No Limit	No Limit							
Sn126			2.06E+02	-	2.06E+06	No Limit	No Limit	No Limit							
Sr89			4.12E+02	-	4.12E+06	No Limit	No Limit	No Limit							
Sr90			9.45E+01	-	9.45E+05	No Limit	No Limit	No Limit							
Tb160			6.07E+02	-	6.07E+06	No Limit	No Limit	No Limit							
Tb161			1.11E+03	-	1.11E+07	No Limit	No Limit	No Limit							
Tc 98			7.44E+02	-	7.44E+06	No Limit	No Limit	No Limit							
Tc 99			1.92E+03	-	1.92E+07	No Limit	No Limit	No Limit							
Te123			1.28E+03	-	1.28E+07	No Limit	No Limit	No Limit							
Te123m			1.28E+03	-	1.28E+07	No Limit	No Limit	No Limit							
Te125m			1.59E+03	-	1.59E+07	No Limit	No Limit	No Limit							
Te127			5.28E+03	-	5.28E+07	No Limit	No Limit	No Limit							
Te127m			6.13E+02	-	6.13E+06	No Limit	No Limit	No Limit							
Te129			3.09E+04	-	3.09E+08	No Limit	No Limit	No Limit							
Te129m			3.45E+02	-	3.45E+06	No Limit	No Limit	No Limit							
Th226			7.93E+03	-	7.93E+07	No Limit	No Limit	No Limit							
Th227			1.11E+02	-	1.11E+06	No Limit	No Limit	No Limit							
Th228			4.93E+01	-	4.93E+05	No Limit	No Limit	No Limit							
Th229			2.36E+01	-	2.36E+05	No Limit	No Limit	No Limit							
Th230			5.80E+01	-	5.80E+05	No Limit	No Limit	No Limit							
Th231			2.39E+03	--	2.39E+07	No Limit	No Limit	No Limit							

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration (RBC) (mg/L or pCi/L)		Risk Factor (mg/L or pCi/L)	Individual MCL	Beta & Photon Emitters MCL C4 Values								MCL
	Total	Body	GI(LL)	GI(S)	Liver	Fat	Thyroid	Pancreas	Bone	Marrow	Kidney	Alpha emitter?	
		(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	
Th232	5.23E+01	--	5.23E+05	No Limit									
Th234	2.29E+02	--	2.29E+06	No Limit									
Tl207	--	--	No Limit	No Limit									
Tl208	--	--	No Limit	No Limit									
Tl209	--	--	No Limit	No Limit									
Tm170	5.92E+02	--	5.92E+06	No Limit									
Tm171	7.55E+03	--	7.55E+07	No Limit									
U230	2.53E+01	--	2.53E+05	No Limit									
U232	1.81E+01	--	1.81E+05	No Limit									
U233	7.35E+01	--	7.35E+05	No Limit									
U234	7.47E+01	--	7.47E+05	No Limit									
U235	7.59E+01	--	7.59E+05	No Limit									
U236	7.88E+01	--	7.88E+05	No Limit									
U237	1.08E+03	--	1.08E+07	No Limit									
U238	8.25E+01	--	8.25E+05	No Limit									
U240	7.51E+02	--	7.51E+06	No Limit									
Xe127	--	--	No Limit	No Limit									
Xe129m	--	--	No Limit	No Limit									
Xe131m	--	--	No Limit	No Limit									
Xe133	--	--	No Limit	No Limit									
Y90	2.92E+02	--	2.92E+06	No Limit									
Y91	3.30E+02	--	3.30E+06	No Limit									
Zn65	4.51E+02	--	4.51E+06	No Limit									
Zr93	4.76E+03	--	4.76E+07	No Limit									
Zr95	1.15E+03	--	1.15E+07	No Limit									
1,1,1-Trichloroethane	--	4.17E-01	No Limit	4.17E-01									
1,1,2,2-Tetrachloroethane	5.52E-03	--	5.52E+01	No Limit									
1,1,2-Trichloroethane	1.99E-02	--	1.99E+02	No Limit									
1,1-Dichloroethane	--	6.38E-01	No Limit	6.38E-01									
1,1-Dichloroethene	4.50E-03	--	4.50E+01	No Limit									
1,2,4-Trichlorobenzene	--	1.40E-01	No Limit	1.40E-01									
1,2-Dichlorobenzene	--	2.89E-01	No Limit	2.89E-01									
1,2-Dichloroethene	1.23E-02	7.99E-03	1.23E+02	7.99E-03									
1,2-Dichlorobenzene (total)	--	4.79E-02	No Limit	4.79E-02									
1,3-Dichlorobenzene	--	4.21E-03	No Limit	4.21E-03									
1,4-Dichlorobenzene	4.92E-02	4.89E-01	4.92E+02	4.89E-01									
1,4-Dioxane	6.11E-01	--	6.11E+03	No Limit									

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration		Risk Factor (mg/L or pCi/L)	Individual		Beta & Photon Emitters MCL C4 Values						MCL	
	(RBC) (mg/L or pCi/L)	MCL		Total Body	GI(LLD) (pCi/L)	GI(S) (pCi/L)	Liver (pCi/L)	Fat (pCi/L)	Thyroid (pCi/L)	Pancreas (pCi/L)	Bone Marrow (FRC) (pCi/L)	Bone (FRC) (pCi/L)	Kidney (pCi/L)
2,4,5-Trichlorophenol	-	2.60E+00	No Limit	2.60E+00	5.60E+03	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
2,4,6-Trichlorophenol	5.60E-01	-	8.29E-02	5.61E-01	5.74E-02	No Limit	No Limit	No Limit	No Limit	No Limit	8.29E-02	5.61E-01	5.74E-02
2,4-Dichlorophenol	-	-	5.61E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	-	-	-
2,4-Dimethylphenol	-	-	5.74E-02	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	5.74E-02	-	-
2,4-Dinitrophenol	-	-	5.72E-02	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	5.72E-02	-	-
2,4-Dinitrotoluene	-	-	2.87E-02	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.87E-02	-	-
2,6-Dinitrotoluene	-	-	1.50E+00	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	1.50E+00	-	-
2-Butanone	-	-	3.66E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	3.66E-01	-	-
2-Chloronaphthalene	-	-	2.39E-02	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.39E-02	-	-
2-Chlorophenol	-	-	1.14E+00	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	1.14E+00	-	-
2-Hexanone	-	-	4.52E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	4.52E-01	-	-
2-Methylnaphthalene	-	-	1.41E+00	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	1.41E+00	-	-
2-Methylphenol	-	-	2.74E-04	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.74E-04	-	-
2-Nitroaniline	-	-	2.28E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.28E-01	-	-
2-Nitrophenol	-	-	1.45E-02	-	-	1.45E+02	No Limit	No Limit	No Limit	No Limit	1.45E+02	No Limit	No Limit
3,3'-Dichlorobenzidine	-	-	-	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	-	-	-
3-Methyl Butanal	-	-	2.74E-04	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.74E-04	-	-
3-Nitroaniline	-	-	5.66E-02	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	5.66E-02	-	-
4,6-Dinitro-2-methylphenol	-	-	-	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	-	No Limit	No Limit
4-Bromophenyl-phenylether	-	-	-	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	-	No Limit	No Limit
4-Chloro-3-methylphenol	-	-	1.09E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	1.09E-01	-	-
4-Chlorophenyl-phenylether	-	-	-	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	-	No Limit	No Limit
4-Chloro-3-methylphenone	-	-	1.25E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	1.25E-01	-	-
4-Methyl-2-Pentanone	-	-	1.41E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	1.41E-01	-	-
4-Methylphenol	-	-	2.74E-04	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.74E-04	-	-
4-Nitroaniline	-	-	2.28E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.28E-01	-	-
4-Nitrophenol	-	-	2.68E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.68E-01	-	-
Acenaphthene	-	-	2.80E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	2.80E-01	-	-
Acenaphthylene	-	-	4.80E-01	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	4.80E-01	-	-
Acetone	-	-	6.25E-02	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	6.25E-02	-	-
Acetonitrile	-	-	3.29E-05	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	3.29E-05	-	-
Acrolein	-	-	3.88E-03	-	-	3.88E+01	No Limit	No Limit	No Limit	No Limit	3.88E+01	2.95E-03	1.35E+00
Anthracene	-	-	1.35E+00	-	-	No Limit	No Limit	No Limit	No Limit	No Limit	1.35E+00	-	-
Aramite	2.48E-01	-	1.33E+00	-	-	2.48E+03	1.33E+00	-	-	-	2.48E+03	-	-
Arcofor-1016	3.92E-02	-	8.24E-04	-	-	3.92E+02	8.24E-04	-	-	-	3.92E+02	0.000125	0.000125
Arcofor-1254	2.05E-03	-	3.51E-04	-	-	2.05E+01	3.51E-04	-	-	-	2.05E+01	3.51E-04	0.000125

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration (RBC) (mg/L or pCi/L)	Risk Factor (mg/L or pCi/L)	Individual MCL						Beta & Photon Emitters MCL C4 Values						MCL	
			Non-Carcinogenic	Carcinogenic	Non-Carcinogenic	Carcinogenic	Total Body	GI(LLI)	GI(S)	Liver	Fat	Thyroid	Pancreas	Bone (FRC)	Bone Marrow (FRC)	Kidney (pCi/L)
Aroclor-1260	1.11E-03	--	1.11E+01	No Limit	0.000125											
Aroclor-1268	1.11E-03	--	1.11E+01	No Limit	0.000125											
Benzene	3.50E-02	8.81E-03	3.50E+02	8.81E-03	0.005											
Benzidine	2.92E-05	8.62E-02	2.92E-01	8.62E-02												
Benzo(a)anthracene	3.71E-03	--	3.71E+01	No Limit												
Benzo(a)pyrene	2.88E-04	--	2.88E+00	No Limit												
Benzo(b)fluoranthene	2.88E-03	--	2.88E+01	No Limit												
Benzo(g,h,i)perylene	--	2.01E-01	No Limit	2.01E-01												
Benzo(k)fluoranthene	4.38E-02	--	4.38E+02	No Limit												
Benzoic acid	--	1.14E+02	No Limit	1.14E+02												
bis(2-Chloroethoxy)methane	--	--	No Limit	No Limit												
bis(2-Chloroethyl)ether	9.77E-04	--	9.77E+00	No Limit												
bis(2-Chloroisopropyl)ether	2.73E-02	1.91E-01	2.73E+02	1.91E-01												
bis(2-Ethylhexyl)phthalate	4.53E-01	5.43E-01	4.53E+03	5.43E-01												
Butane,1,1,3,4-Tetrachloro-Butylbenzylphthalate	--	--	No Limit	No Limit												
Carbazole	2.88E-01	--	2.88E+03	No Limit												
Carbon Disulfide	--	8.13E-01	No Limit	8.13E-01												
Chlorobenzene	--	8.28E-02	No Limit	8.28E-02												0.1
Chloroethane	3.85E-01	6.72E+00	3.85E+03	6.72E+00												
Chloromethane	1.51E-01	4.96E-01	1.51E+03	4.96E-01												
Chrysene	9.08E-01	--	9.08E+03	No Limit												
Decane, 3,4-Dimethyl	--	--	No Limit	No Limit												
Diacetone alcohol	--	--	No Limit	No Limit												
Dibenz(a,h)anthracene	1.55E-04	--	1.84E-02	1.55E+00												
Dibenzo furan	--	2.29E+01	No Limit	2.29E+01												
Diethylphthalate	--	--	No Limit	No Limit												
Dimethyl Disulfide	--	--	No Limit	No Limit												
Dimethylphthalate	--	2.87E+02	No Limit	2.87E+02												
Di-n-butylphthalate	--	4.75E-01	No Limit	4.75E-01												
Di-n-octylphthalate	--	1.04E-02	No Limit	1.04E-02												
Eicosane	--	--	No Limit	No Limit												
Ethyl cyanide	--	--	No Limit	No Limit												
Ethylbenzene	--	1.01E+00	No Limit	1.01E+00												0.7
Famphur	--	--	No Limit	No Limit												
Fluoranthene	--	6.94E-01	No Limit	6.94E-01												
Fluorene	--	7.90E-01	No Limit	7.90E-01												

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration		Risk Factor (mg/L or pCi/L)	Individual MCL		Beta & Photon Emitters MCL C4 Values						MCL	
	(RBC) (mg/L or pCi/L)	(mg/L or pCi/L)		Total	Body	GI(LLI) (pCi/L)	GI(ULLI) (pCi/L)	GI(S) (pCi/L)	Liver	Fat	Thyroid	Pancreas	
	Non-Carcinogenic	Carcinogenic	Carcinogenic	pCi/L or mg/L	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)	Marrow
Heptadecane, 2,6,10,15-Tetra	--	--	1.66E-02	3.03E+01	3.03E+01	1.66E-02	1.66E-02	0.001					
Hexachlorobenzene	3.03E-03	7.06E-02	7.09E-03	7.06E+02	7.06E+02	7.09E-03							
Hexachlorobutadiene	--	--	1.92E-01	No Limit	No Limit	1.92E-01							
Hexachlorocyclopentadiene	--	4.46E-01	2.68E-02	4.46E+03	4.46E+03	2.68E-02							
Hexachloroethane	4.46E-01	2.05E-03	--	2.05E+01	No Limit								
Indeno[1,2,3-cd]pyrene	2.05E-03	--	8.60E+00	No Limit	8.60E+00								
Isobutyl alcohol	--	7.02E+00	5.72E+00	7.02E+04	7.02E+04	5.72E+00							
Isophorone	7.02E+00	--	--	No Limit	No Limit	No Limit							
Isopropyl Alcohol/2-propanol	--	3.74E-04	--	3.74E+00	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Kepone	--	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Mesityl oxide	--	--	4.80E+00	No Limit	No Limit	4.80E+00							
Methyl Acetate	--	4.26E-01	1.27E+00	4.26E+03	4.26E+03	1.27E+00							
Methylene Chloride	4.26E-01	--	4.89E-03	No Limit	No Limit	4.89E-03							
Naphthalene	--	--	2.67E-03	No Limit	No Limit	2.67E-03							
Nitrobenzene	--	9.56E-04	--	9.56E+00	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
N-Nitroso-di-n-propylamine	9.56E-04	1.29E+00	--	1.29E+04	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
N-Nitrosodiphenylamine	1.29E+00	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Octane 2,3,7-Trimethyl	--	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
o-Toluenesulfonamide	--	--	--	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Pentachlorophenol	2.56E-02	3.94E-01	2.56E+02	2.56E+02	2.56E+02	3.94E-01							
Phenanthrene	--	5.78E+00	5.78E+00	No Limit	No Limit	5.78E+00							
Phenol	--	1.71E+01	No Limit	No Limit	No Limit	1.71E+01							
Phenol,2,6-Bis(1,1-Dimethyl)-p-Toluenesulfonamide	--	--	--	No Limit	No Limit	No Limit							
Pyrene	--	5.45E-01	5.45E-01	No Limit	No Limit	5.45E-01							
RDX	5.91E-02	8.35E-02	5.91E+02	5.91E+02	5.91E+02	8.35E-02							
Styrene	--	1.27E+00	1.27E+00	No Limit	No Limit	1.27E+00							
Tetrachloroethene	1.01E-01	1.89E-01	1.01E+03	1.01E+03	1.01E+03	1.89E-01							
Toluene	--	5.66E-01	No Limit	No Limit	No Limit	5.66E-01							
Tributylphosphate	--	--	--	No Limit	No Limit	No Limit							
Trichloroethene	1.63E-01	2.87E-02	1.63E+03	1.63E+03	1.63E+03	2.87E-02							
Trinitrotoluene	2.18E-01	1.40E-02	2.18E+03	2.18E+03	2.18E+03	1.40E-02							
Undecane,4,6-Dimethyl-Xylene (ortho)	--	--	1.13E+00	No Limit	No Limit	1.13E+00							
Xylene (total)	--	--	1.13E+00	No Limit	No Limit	1.13E+00							
Aluminum	--	2.88E+01	< Background	< Background	< Background	< Background							

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration (RBC) (mg/L or pCi/L)	Risk Factor (mg/L or pCi/L)	Beta & Photon Emitters MCL C4 Values												MCL
			Carcinogenic			Non-Carcinogenic			Carcinogenic			Non-Carcinogenic			
	Total Body	GI(LI)	GI(S)	Liver	Fat	Thyroid	Pancreas	Bone	Marrow	Bone	Marrow	Bone	Marrow	Kidney	Alpha emitter?
Antimony	--	1.14E-02	No Limit	1.14E-02	0.006										
Arsenic	4.47E-03	8.63E-03	< Background	< Background	0.05										
Barium	--	1.97E+00	< Background	< Background	2										
Beryllium	--	4.57E-02	< Background	< Background	0.004										
Boron	--	2.59E+00	No Limit	2.59E+00											
Cadmium	--	1.39E-02	No Limit	1.39E-02	0.005										
Calcium	--	--	< Background	< Background											
Chloride	--	--	No Limit	No Limit	0.1										
Chromium	--	--	< Background	< Background											
Cobalt	--	1.73E+00	No Limit	No Limit											
Copper	--	1.07E+00	No Limit	1.07E+00	1.300										
Cyanide	--	5.76E-01	No Limit	5.76E-01	0.2										
Dysprosium	--	5.76E+00	No Limit	5.76E+00											
Fluoride	--	1.73E+00	No Limit	1.73E+00	4										
Iron	--	8.63E+00	< Background	< Background											
Lead	--	--	No Limit	No Limit	0.015										
Magnesium	--	--	< Background	< Background											
Manganese	--	6.71E-01	< Background	< Background											
Mercury	--	8.42E-03	No Limit	8.42E-03	0.002										
Molybdenum	--	1.44E-01	No Limit	1.44E-01											
Nickel	--	5.51E-01	< Background	< Background											
Nitrate	--	4.60E+01	No Limit	4.60E+01	44										
Nitrate/Nitrite-N	--	--	No Limit	No Limit											
Nitrite	--	2.88E+00	No Limit	2.88E+00	3										
Phosphorus	--	--	< Background	< Background											
Potassium	--	--	No Limit	No Limit	0.05										
Selenium	--	1.44E-01	No Limit	1.44E-01											
Silver	--	1.38E-01	No Limit	1.38E-01											
Sodium	--	--	< Background	< Background											
Strontium	--	1.73E+01	No Limit	1.73E+01											
Sulfate	--	--	No Limit	No Limit	0.05										
Sulfide	--	--	No Limit	No Limit											
Terbium	--	1.90E-03	< Background	< Background											
Thallium	--	1.88E-01	< Background	< Background	0.002										
Vanadium	--	--	No Limit	No Limit											
Ytterbium	--	8.63E+00	No Limit	8.63E+00											
Zinc	--	--	No Limit	No Limit											

Table B-4. Summary of Input Parameters for RAO Calculations

Constituent	Individual Concentration (RBC) (mg/L or pCi/L)		Risk Factor (mg/L or pCi/L)		Individual MCL		Beta & Photon Emitters MCL C4 Values						Bone Marrow		MCL		
	Non- Carcinogenic	Carcinogenic	Non- Carcinogenic	Carcinogenic	Total Body	GI(LL) (pCi/L)	GI(ULI) (pCi/L)	GI(S) (pCi/L)	Liver (pCi/L)	Fat (pCi/L)	Thyroid (pCi/L)	Pancreas (pCi/L)	Bone (FRC) (pCi/L)	Bone (FRC) (pCi/L)	Kidney (pCi/L)	Alpha emitter? (pCi/L)	
Zirconium	--	--	No Limit	No Limit													

NA= Not available

-- = Not Calculated

< Background = constituent design inventory concentration is less than background and therefore not incorporated into risk evaluations

Table B-5. Comparison of C_t Maximum Values and MCL Limits

Constituent	C _t Maximum Values pCi/L or mg/L	MCL pCi/L or mg/L	Is Maximum C _t > MCL?
1,1,1-Trichloroethane	4.3E-27	0.2	Yes
1,1,2-Trichloroethane	4.6E-27	0.005	Yes
1,2,4-Trichlorobenzene	4.9E-49	0.07	Yes
1,2-Dichloroethane	9.2E-35	0.005	Yes
Aroclor-1016	0.0E+00	0.000125	Yes
Aroclor-1254	0.0E+00	0.000125	Yes
Aroclor-1260	0.0E+00	0.000125	Yes
Aroclor-1268	0.0E+00	0.000125	Yes
Benzene	5.7E-25	0.005	Yes
Benzo(a)pyrene	0.0E+00	0.0002	Yes
Chlorobenzene	3.2E-48	0.1	Yes
Ethylbenzene	1.5E-72	0.7	Yes
Hexachlorobenzene	0.0E+00	0.001	Yes
Hexachlorocyclopentadiene	0.0E+00	0.05	Yes
Pentachlorophenol	4.6E-26	0.001	Yes
Styrene	1.0E-79	0.1	Yes
Toluene	8.1E-190	1	Yes
Xylene (total)	2.2E-50	10	Yes
Antimony	4.8E-06	0.006	Yes
Arsenic	3.6E-04	0.05	Yes
Barium	1.5E-04	2	Yes
Beryllium	1.4E-08	0.004	Yes
Cadmium	3.0E-06	0.005	Yes
Chromium	3.4E-05	0.1	Yes
Copper	2.5E-05	1.300	Yes
Cyanide	4.0E-05	0.2	Yes
Fluoride	4.6E-04	4	Yes
Lead	2.8E-06	0.015	Yes
Mercury	4.6E-07	0.002	Yes
Nitrate	4.7E-04	44	Yes
Nitrite	1.0E-06	3	Yes
Selenium	7.0E-07	0.05	Yes
Thallium	1.8E-08	0.002	Yes